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(U.S.) Geological Survey, Lansing, MI

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U.S. DEPARTMENT OF THE INTERIOR
March 3, 1849

STATE OF MICHIGAN
DEPARTMENT OF NATURAL RESOURCES

Water Resources Data Michigan

Water Year 1983

U.S.GEOLOGICAL SURVEY WATER-DATA REPORT MI-83-1
Prepared in cooperation with the State of Michigan
and with other agencies

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SPRINGFIELD, VA. 22161

CALENDAR FOR WATER YEAR 1983

1982

OCTOBER

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U.S. DEPARTMENT OF THE INTERIOR
March 3, 1849

STATE OF MICHIGAN
DEPARTMENT OF NATURAL RESOURCES

Water Resources Data Michigan

Water Year 1983

by John B. Miller, John L. Oberg, and Theodore Sieger Jr.

U.S.GEOLOGICAL SURVEY WATER-DATA REPORT MI-83-1

Prepared in cooperation with the State of Michigan and with other agencies

I

UNITED STATES DEPARTMENT OF THE INTERIOR

WILLIAM P. CLARK, Secretary

GEOLOGICAL SURVEY

Dallas L. Peck, Director

For information on the water program in Michigan write to
District Chief, Water Resources Division
U.S. Geological Survey
6520 Mercantile Way, Suite 5
Lansing, Michigan 48910

1984

PREFACE

This volume of the annual hydrologic data report of Michian is one of a series of annual reports that document hydrologic data gathered from the U.S. Geological Survey's surface- and ground-water data-collection networks in each State, Puerto Rico, and the Trust Territories. These records of streamflow, ground-water levels, and quality of water provide the hydrologic informatin needed by State, local, and Federal agencies, and the private sector for developing and managing our Nation's land and water resources. Hydrologic data for Michigan are contained in volume 1.

This report is the culmination of a concerted effort by dedicated personnel of the U.S. Geological Survey who collected, compiled, analyzed, verified, and organized the data, and who typed, edited, and assembled the report. In addition to the authors, who had primary responsibility for assuring that the information contained herein is accurate, complete, and adheres to Geological Survey policy and established guidelines, the following individuals contributed significantly to the collection, processing, and tabulation of the data:

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Water resources data for the 1983 water year for Michigan consist of records of stage, discharge, and water quality of streams; stage, contents, and water quality of lakes and reservoirs; and water levels and water temperature of ground water. This report contains discharge records for 143 gaging stations; stage only records for 3 gaging stations; stage and contents for 5 lakes and reservoirs; water quality for 33 continuous-record stations; and water levels for 53 observation wells. Also included are 74 crest-stage partial-record stations and 8 low-flow partial-record stations. Additional water data were collected at various sites, not part of the systematic data-collection program, and are published as miscellaneous measurements. These data represent that part of the National Water Data System operated by the U.S. Geological Survey and cooperating State and Federal agencies in Michigan.

17. Document Analysis a. Descriptors

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GAGING STATIONS, IN DOWNSTREAM ORDER, FOR WHICH RECORDS ARE PUBLISHED

Letter after station name designates type of data: (d) discharge, (c) chemical, (g) gage height, (m) microbiological, (p) pesticide, (r) radio-chemical, (t) water temperature, (s) sediment

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WATER RESOURCES DATA FOR MICHIGAN, 1983

INTRODUCTION

Water resources data for the 1983 water year for Michigan consist of records of stage, discharge and water quality of streams; stage, contents, and water quality of lakes and reservoirs; and water levels and water temperature of ground-water wells. This volume contains records for water discharge at 143 gaging stations; stage only at 3 gaging stations; stage and contents at 5 lakes and reservoirs; water quality at 33 gaging stations; and water levels at 53 observation wells. Locations of these sites are shown on figures 4-9. Also included are data for 74 crest-stage partial-record stations and 8 low-flow partial-record stations. Additional water data were collected at various sites not involved in the systematic data-collection program and are published as miscellaneous measurements and analyses. These data represent that part of the National Water Data System operated by the U.S. Geological Survey and cooperating State, local, and Federal agencies in Michigan.

Records of discharge and stage of streams, and contents or stage of lakes and reservoirs were first published in a series of U.S. Geological Survey water-supply papers entitled, "Surface Water Supply of the United States." Through September 30, 1960, these water-supply papers were in an annual series and then in a 5-year series for 1961-65 and 1966-70. Records of chemical quality, water temperatures, and suspended sediment were published from 1941 to 1970 in an annual series of water-supply papers entitled, "Quality of Surface Waters of the United States." Records of ground-water levels were published from 1935 to 1974 in a series of water-supply papers entitled, "Ground Water Levels in the United States." Water-supply papers may be consulted in the libraries of the principal cities in the United States or may be purchased from Branch of Distribution, U.S. Geological Survey, 604 South Pickett Street, Alexandria, VA 22304.

For water years 1961 through 1974, streamflow data was released by the Geological Survey in annual reports on a State-boundary basis. Water-quality records for water years 1964 through 1974 were similarly released either in separate reports or in conjunction with streamflow records. Ground-water records beginning with the 1956 calendar year and continuing through calendar year 1982 have been released by the Geological Survey in annual reports on a State-boundary basis.

Beginning with the 1975 water year, water data for streamflow, water quality, and ground water are published in official Survey reports on a State-boundary basis. These official Survey reports carry an identification number consisting of the two-letter State abbreviation, the last two digits of the water year, and volume number. For example, this volume is identified as "U.S. Geological Survey Water-Data Report MI-83-1." These water-data reports are for sale in paper copy or in microfiche by the National Technical Information Service, U.S. Department of Commerce, Springfield, VA 22161.

Additional information, including current prices, for ordering specific reports may be obtained from the district chief at the address given on the back of the title page or by telephone, 517-377-1608.

COOPERATION

The U.S. Geological Survey and organizations of the State of Michigan have had cooperative agreements for the systematic collection of streamflow records since 1930, for ground-water levels since 1932, and for water-quality records since 1951. Organizations that assisted in collecting data through cooperative agreement with the Survey are:

State Department of Natural Resources, H.A. Tanner, director, succeeded by R. O. Skoog, through Water Management Division, L. N., Witte, Chief, and Geological Survey Division, T.R. Segall, Chief.

State Department of State Highways, J. P. Woodford, director, succeeded by J. P. Pitz.

Assistance in the form of funds or services was given by the Corps of Engineers, U.S. Army, in collecting records for 19 gaging stations published in this report. Assistance was also furnished by the National Weather Service, National Oceanic Atmospheric Administration, U.S. Department of Commerce, U.S. Environmental Protection Agency, and the National Park Service.

The following organizations aided in collecting records:

Dickinson County Road Commission; Macomb County Board of Supervisors; Oakland County Department of Public Works; Oakland County Drain Commission; Genesee County Drain Commission; Huron-Clinton Metropolitan Authority; Cities of Ann Arbor, Battle Creek, Coldwater, Flint, Imlay City, Kalamazoo, Lansing, Portage, and Ypsilanti; Allied Paper Inc.; American Aggregate Corp; Consumers Power Co.; Cleveland Cliffs Iron Co.; Detroit Edison Co.; Fisher Body Division of General Motors Corp.; Michigan Power Co.; Michigan Sugar Co.; Peter Eckrich and Sons, Inc.; Upper Peninsula Power Co.; and Wisconsin-Electric Power Co.

Organizations that supplied data are acknowledged in station descriptions.

SUMMARY OF HYDROLOGIC CONDITIONS

Streamflow during the 1983 water year was excessive in the Upper Peninsula and in the northern part of the Lower Peninsula. In the southern part of the Lower Peninsula, streamflow was not excessive but was 135 percent of median. Part of the cause of this excessive runoff was the above normal temperatures and precipitation in the form of rain that occurred during winter months. The period December through February was the 13th warmest winter period in the last 200 years.

In the Upper Peninsula, runoff was excessive for nine consecutive months beginning in July 1982 and ending in March 1983. Runoff during April was deficient due to below-normal temperatures and precipitation. Moderate to heavy precipitation increased runoff to the excessive range in June. For the remainder of the water year, runoff was in the normal range. The mean annual flow at Sturgeon River near Sidnaw was the third highest in 43 years of record. Other gaging stations having near record high mean annual flows were: Menominee River near Florence, Wisconsin, fourth highest in 69 years of record; Paint Creek near Crystal Falls, second highest in 39 years of record, and Ontonagon River near Rockland, second highest in 41 years of record.

In the northern part of the Lower Peninsula, runoff at the index station Muskegon River at Evart was excessive during the months of December through March, May, June, and September. In the southern part, runoff at the index station Red Cedar River at East Lansing was excessive November, December, and April through July. At both index stations runoff was normal during the remaining months.

Figure 1, the monthly and annual mean discharges is compared with the median discharge during 1951-80 at the three index stations.

Ground-water levels in the Upper Peninsula were above normal in the western half. In the eastern half, levels were below normal during October, November, and December, but rose to normal levels in January and remained at normal levels the rest of the year. In the northern part of the Lower Peninsula, levels were well above normal and, at times, near record highs. In the southern part, levels were normal except in the southeast where below normal levels existed most of the year.

In 1983, dissolved-solids concentration as recorded by Michigan's NASQAN stations, compare closely with average station values for 1974-82. No abnormally high concentrations of common and trace dissolved inorganic constituents were found at any of the NASQAN stations.

DEFINITION OF TERMS

Terms related to streamflow, water-quality, and other hydrologic data, as used in this report, are defined below. See also the table for converting English units to International System of Units (SI) on the inside of the back cover.

Acre-foot (AC-FT, acre-ft) is the quantity of water required to cover 1 acre to a depth of 1 foot and is equivalent to 43,560 cubic feet or about 326,000 gallons or 1,233 cubic meters.

Adenosine triphosphate (ATP) is the primary energy donor in cellular life process. Its central role in living cells makes it an excellent indicator of the presence of living material in water. A measure of ATP therefore provides a sensitive and rapid estimate of biomass. ATP is reported in micrograms per liter of the original water sample.

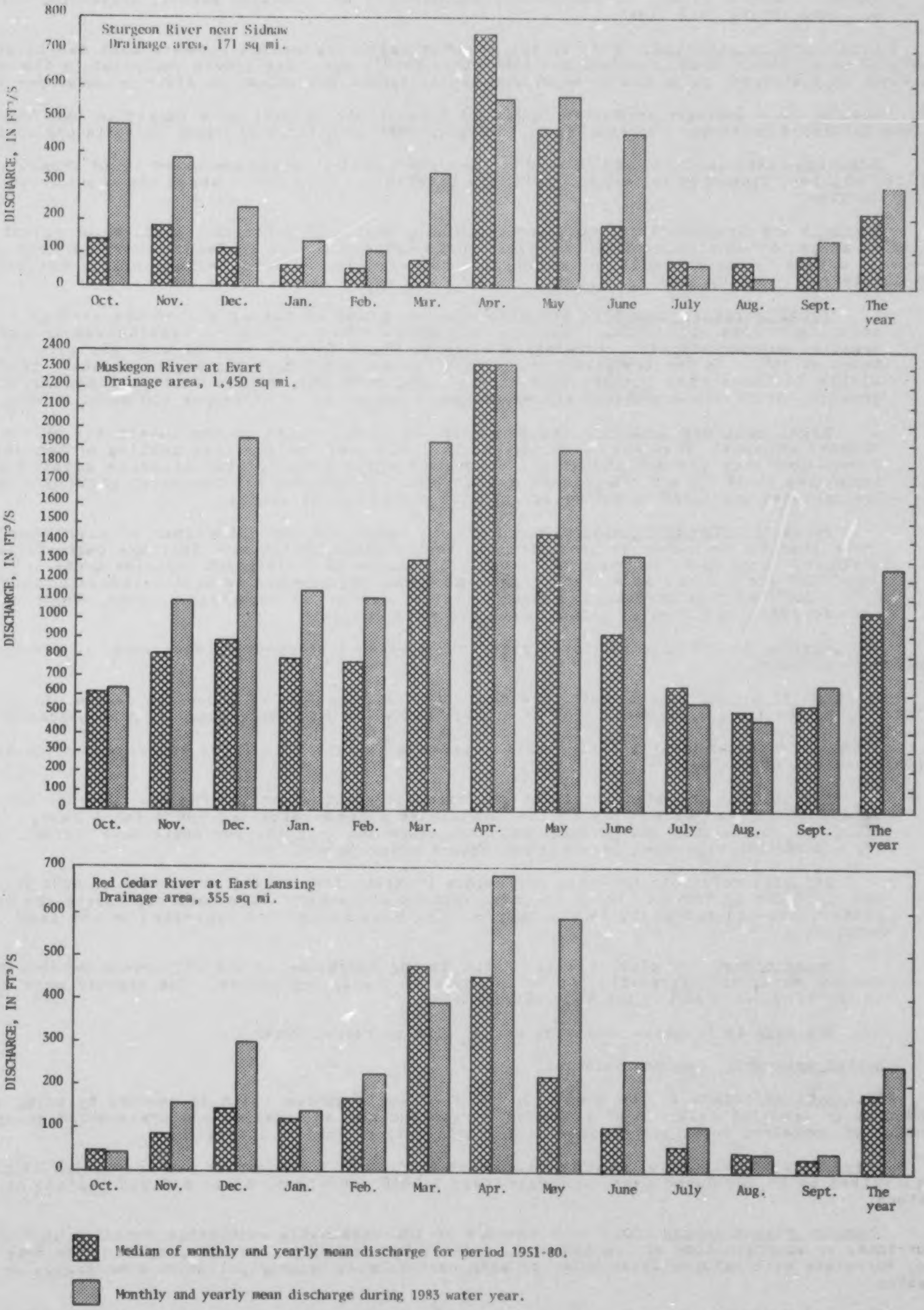


Figure 1. Discharge during 1983 water year compared with median discharge for period 1951-80 for three representative stations.

Algae are mostly aquatic single-celled, colonial, or multi-celled plants, containing chlorophyll and lacking roots, stems, and leaves.

Algal growth potential (AGP) is the maximum algal dry weight biomass that can be produced in a natural water sample under standardized laboratory conditions. The growth potential is the algal biomass present at stationary phase and is expressed as milligrams dry weight of algae produced per liter sample.

Aquifer is a geologic formation, group of formations, or part of a formation that contains sufficient saturated permeable material to yield significant quantities of water to wells and springs.

Artesian means confined and is used to describe a well in which the water level stands above the top of the aquifer, tapped by the well. A flowing artesian well is one in which the water level is above the land surface.

Bacteria are microscopic unicellular organisms, typically spherical, rodlike, or spiral and threadlike in shape, often clumped into colonies. Some bacteria cause disease, others perform an essential role in nature in the recycling of materials; for example, by decomposing organic matter into a form available for reuse by plants.

Total coliform bacteria are a particular group of bacteria that are used as indicators of possible sewage pollution. They are characterized as aerobic or facultative anaerobic, gram-negative nonspore-forming, rod-shaped bacteria which ferment lactose with gas formation within 48 hours at 35°C. In the laboratory these bacteria are defined as the organisms which produce colonies within 24 hours when incubated at 35°C ± 1.0°C on M-Endo medium (nutrient medium for bacterial growth). Their concentrations are expressed as number of colonies per 100 mL of sample.

Fecal coliform bacteria are bacteria that are present in the intestines or feces of warm-blooded animals. They are often used as indicators of the sanitary quality of the water. In the laboratory they are defined as all organisms which produce blue colonies within 24 hours when incubated at 44.5°C ± 0.2°C on M-FC medium (nutrient medium for bacterial growth). Their concentrations are expressed as number of colonies per 100 mL of sample.

Fecal streptococcal bacteria are bacteria found also in intestines of warm-blooded animals. Their presence in water is considered to verify fecal pollution. They are characterized as gram-positive, cocci bacteria which are capable of growth in brain-heart infusion broth. In the laboratory they are defined as all the organisms which produce red or pink colonies within 48 hours at 35°C ± 1.0°C on M-enterrococcus medium (nutrient medium for bacterial growth). Their concentrations are expressed as number of colonies per 100 mL of sample.

Bed material is the unconsolidated material of which a streambed, lake, pond, reservoir, or estuary bottom is composed.

Biochemical oxygen demand (BOD) is a measure of the quantity of dissolved oxygen, in milligrams per liter, necessary for the decomposition of organic matter by microorganisms, such as bacteria.

Biomass is the amount of living matter present at any given time, expressed as the mass per unit area of volume of habitat.

Ash mass is the mass or amount of residue present after the residue from the dry mass determination has been ashed in a muffle furnace at a temperature of 500°C for 1 hour. The ash mass values of zooplankton and phytoplankton are expressed in grams per cubic meter (g/m^3), and periphyton and benthic organisms in grams per square meter (g/m^2).

Dry mass refers to the mass of residue present after drying in an oven at 60°C for zooplankton and 105°C for periphyton, until the mass remains unchanged. This mass represents the total organic matter, ash and sediment, in the sample. Dry mass values are expressed in the same units as ash mass.

Organic mass or volatile mass of the living substance is the difference between the dry mass and ash mass, and represents the actual mass of the living matter. The organic mass is expressed in the same units as for ash mass and dry mass.

Wet mass is the mass of living matter plus contained water.

Bottom material: See Bed material.

Cells/volume refers to the number of cells of any organism which is counted by using a microscope and grid or counting cell. Many planktonic organisms are multicelled and are counted according to the number of contained cells per sample, usually milliliters (mL) or liters (L).

Cfs-day is the volume of water represented by flow of 1 cubic foot per second for 24 hours. It is equivalent to 86,400 cubic feet, approximately 1.9835 acre-feet, about 646,000 gallons or 2,447 cubic meters.

Chemical oxygen demand (COD) is a measure of the chemically oxidizable material in the water, and furnishes an approximation of the amount of organic and reducing material present. The determined value may correlate with natural water color or with carbonaceous organic pollution from sewage or industrial wastes.

Chlorophyll refers to the green pigments of plants. Chlorophyll a and b are the two most common pigments in plants.

Color unit is produced by one milligram per liter of platinum in the form of the chloroplatinate ion. Color is expressed in units of the platinum-cobalt scale.

Contents is the volume of water in a reservoir or lake. Unless otherwise indicated, volume is computed on the basis of a level pool and does not include bank storage.

Control designates a feature downstream from the gage that determines the stage-discharge relation at the gage. This feature may be a natural constriction of the channel, an artificial structure, or a uniform cross section over a long reach of the channel.

Control structure as used in this report is a structure on a stream or canal that is used to regulate the flow or stage of the stream or to prevent the intrusion of salt water.

Cubic feet per second per square mile (CFSM) is the average number of cubic feet of water flowing per second from each square mile of area drained, assuming that the runoff is distributed uniformly in time and area.

Cubic foot per second (FT^3/s, ft^3/s) is the rate of discharge representing a volume of 1 cubic foot passing a given point during 1 second and is equivalent to approximately 7.48 gallons per second or 448.8 gallons per minute or 0.02832 cubic meters per second.

Discharge is the volume of water (or more broadly, volume of fluid plus suspended sediment), that passes a given point within a given period of time.

Mean discharge (MEAN) is the arithmetic mean of individual daily mean discharges during a specific period.

Instantaneous discharge is the discharge at a particular instant of time.

Dissolved refers to the amount of substance present in true chemical solution. In practice, however, the term includes all forms of substance that will pass through a 0.45-micrometer membrane filter, and thus may include some very small (coloidal) suspended particles. Analyses are performed on filtered samples.

Diversity index is a numerical expression of evenness of distribution of aquatic organisms. The formula for diversity index is:

$$\bar{d} = -\sum_{i=1}^{s} \frac{n_i}{n} \log_2 \frac{n_i}{n}$$

Where n_i is the number of individuals per taxon, n is the total number of individuals, and s is the total number of taxa in the sample of the community. Diversity index values range from zero, when all the organisms in the sample are the same, to some positive number, when some or all of the organisms in the sample are different.

Drainage area of a stream at a specific location is that area, measured in a horizontal plane, enclosed by a topographic divide from which direct surface runoff from precipitation normally drains by gravity into the river above the specified point. Figures of drainage area given herein include all closed basins, or noncontribution areas, within the area unless otherwise noted.

Drainage basin is a part of the surface of the earth that is occupied by a drainage system, which consists of a surface stream or a body of impounded surface water together with all tributary surface streams and bodies of impounded surface water.

Gage height (G.H.) is the water-surface elevation referred to some arbitrary gage datum. Gage height is often used interchangeably with the more general term "stage", although gage height is more appropriate when used with a reading on a gage.

Gaging station is a particular site on a stream, canal, lake, or reservoir where systematic observations of hydrologic data are obtained.

Hardness of water is a physical-chemical characteristic that is commonly recognized by the increased quantity of soap required to produce lather. It is attributable to the presence of alkalined earths (principally calcium and magnesium) and is expressed as equivalent calcium carbonate ($CaCo_3$).

Hydrologic unit is a geographic area representing part or all of a surface drainage basin or distinct hydrologic feature as delineated by the Office of Water Data Coordination on the State Hydrologic Unit Maps; each hydrologic unit is identified by an 8-digit number.

Metamorophic stage refers to the stage of development that an organism exhibits during its transformation from an immature form to an adult form. This developmental process exists for most insects, and the degree of difference from the immature stage to the adult form varies from relatively slight to pronounced, with any intermediates. Examples of metamorphic stages of insects are egg-larva-adult or egg-nymph-adult.

Methylene blue active substance (MBAS) is a measure of apparent detergents. This determination depends on the formation of a blue color when methylene blue dye reacts with synthetic detergent compounds.

Micrograms per gram ($\mu g/g$) is a unit expressing the concentration of a chemical element as the mass (micrograms) of the element sorbed per unit mass (gram) of sediment.

Micrograms per liter (μG/L, μg/L) is a unit expressing the concentration of chemical constituents in solution as mass (micrograms) of solute per unit volume (liter) of water. One thousand micrograms per liter is equivalent to one milligram per liter.

Milligrams per liter (MG/L, mg/L) is a unit for expressing the concentration of chemical constituents in solution. Milligrams per liter represent the mass of solute per unit volume (liter) of water. Concentration of suspended sediment also is expressed in mg/L, and is based on the mass of sediment per liter of water-sediment mixture.

National Geodetic Vertical Datum of 1929 (NGVD) is a geodetic datum derived from a general adjustment of the first order level nets of both the United States and Canada. It was formerly called "Sea Level Datum of 1929" or "mean sea level" in this series of reports. Although the datum was derived from the average sea level over a period of many years at 26 tide stations along the Atlantic, Gulf of Mexico, and Pacific Coasts, it does not necessarily represent local mean sea level at any particular place.

Organism is any living entity, such as an insect, phytoplankter, or zooplankter.

Organism count/area refers to the number of organisms collected and enumerated in a sample and adjusted to the number per area habitat, usually square meters (m^2), acres, or hectares. Periphyton benethic organisms, and macrophytes are expressed in these terms.

Organism count/volume refers to the number or organisms collected and enumerated in a sample and adjusted to the number per sample volume, usually milliliters (mL) or liters (L). Numbers of planktonic organisms can be expressed in these terms.

Total organism count is the total number of organisms collected and enumerated in any particular sample.

Partial-record station is a particular site where limited streamflow and/or water-quality data are collected systematically over a period of years for use in hydrologic analyses.

Particle-size is the diameter, in millimeters (mm), of suspended sediment or bed material determined by either sieve or sedimentation methods. Sedimentation methods (pipet, bottom-withdrawal tube, visual-accumulation tube) determine fall diameter of particles in either distilled water (chemically dispersed) or in native water (the river water at the time and point of sampling).

Particle-size classification used in this report agrees with recommendations made by the American Geophysical Union Subcommittee on Sediment Terminology.

The classification is as follows:

Classification	Size (mm)	Method of analyses
Clay	0.00024 - 0.004	Sedimentation
Silt	.004 - .062	Sedimentation
Sand	.062 - 2.0	Sedimentation or sieve
Gravel	2.0 - 64.0	Sieve

The particle-size distributions given in this report are not necessarily representative of all particles in transport in the stream. Most of the organic material is removed and the sample is subjected to mechanical and chemical dispersion before analysis in distilled water. Chemical dispersion is not used for native water analysis.

Percent composition is a unit for expressing the ratio of a particular part of a sample or population to the total sample or population, in terms of types, numbers, mass or volume.

Periphyton is the assemblage of microorganisms attached to and growing upon solid surfaces. While primarily consisting of algae, they also include bacteria, fungi, protozoa, rotifers, and other small organisms. Periphyton is a useful indicator of water quality.

Pesticides are chemical compounds used to control undesirable plants and animals. Major categories of pesticides include insecticides, miticides, fungicides, herbicides, and rodenticides. Insecticides and herbicides, which control insects and plants respectively, are the two categories reported.

Picocurie (PC,pCi) is one trillionth (1×10^{12}) of the amount of radioactivity represented by a curie (Ci). A curie is the amount of radioactivity that yields 3.7×10^{10} radioactive disintegrations per second. A picocurie yields 2.22 dpm (disintegrataions per minute).

Plankton is a community of suspended, floating, or weakly swimming organisms that live in the open water of lakes and rivers.

Phytoplankton is the plant part of the plankton. They are usually microscopic and their movement is subject to the water currents. Phytoplankton growth is dependent upon solar radiation and nutrient substances. Because they are able to incorporate as well as release materials to the surrounding water, the phytoplankton have a profound effect upon the quality of water. They are the primary food producers in the aquatic environment, and are commonly known as algae.

Blue-green algae are a group of phytoplankton organisms having a blue pigment, in addition to the green pigment called chlorophyll. Blue-green algae often cause nuisance conditions in water.

Diatoms are the unicellular or colonial algae having a siliceous shell. Their concentrations are expressed as number of cells/mL of sample.

Green algae have chlorophyll pigments similar in color to those of higher green plants. Some forms produce algall mats or floating "moss" in lakes. Their concentrations are expressed as number of cells/mL of sample.

Zooplankton is the animal part of the plankton. Zooplankton are capable of extensive movements within the water column, and are often large enough to be seen with the unaided eye. Zooplankton are secondary consumers feeding upon bacteria, phytoplankton, and detritus. Because they are the grazers in the aquatic environment, the zooplankton are a vital part of the aquatic food web. The zooplankton community is dominated by small crustaceans and rotifers.

Polychlorinated biphenyls (PCBs) are industrial chemicals that are mixtures of chlorinated biphenyl compounds having various percentages of chlorine. They are similar in structure to organochlorine insecticides.

Primary productivity is a measure of the rate at which new organic matter is formed and accumulated through photosynthetic and chemosynthetic activity of producer organisms (chiefly green plants). The rate of primary production is estimated by measuring the amount of oxygen released (oxygen method) or the amount of carbon assimilated by the plants (carbon method).

Milligrams of carbon per area or volume per unit time [mg $C/(m^2\cdot time)$] for periphyton and macrophtes and [mg $C/(m^3\cdot time)$] for phytoplankton are units for expressing primary productivity. They define the amount of carbon dioxide consumed as measured by radioactive carbon (carbon 14). The carbon 14 method is of greater sensitivity than the oxygen light and dark bottle method, and is preferred for use in unenriched waters. Unit time may be either the hour or day, depending on the incubation period.

Milligrams of oxygen per area or volume per unit time [mg $O_2/(m^2\cdot time)$] for periphyton and macrophytes and [mg $O_2/(m^3\cdot time)$] for phytoplankton are units for expressing primary productivity. They define production and respiration rates as estimated from changes in the measured dissolved oxygen concentration. The oxygen light and dark bottle method is preferred if the rate of primary production is sufficient for accurate measurements to be made within 24 hours. Unit time may be either the hour or day, depending on the incubation period.

Runoff in inches (IN, in) shows the depth to which the drainage area would be covered if all the runoff for a given time period were uniformly distributed on it.

Sediment is solid material that originates mostly from disintegrated rocks and is transported by, suspended in, or deposited from water; it includes chemical and biochemical precipitates and decomposed organic material, such as humus. The quantity, characteristics, and cause of the occurrence of sediment in streams are influenced by environmental factors. Some major factors are degree of slope, length of slope, soil characteristics, land usage, and quantity and intensity of precipitation.

Suspended sediment is the sediment that at any given time is maintained in suspension by the upward components of turbulent currents or that exists in suspension as a colloid.

Suspended-sediment concentration is the velocity-weighted concentration of suspended sediment in the sampled zone (from the water surface to a point approximately 0.3 ft above the bed) expressed as milligrams of dry sediment per liter of water-sediment mixture (mg/L).

Suspended-sediment discharge (tons/day) is the sum of the suspended-sediment discharge and the bed-load discharge. It is the total quantity of sediment, as measured by dry weight or volume, that passes a section during a given time. It is computed by multiplying discharge times mg/L times 0.0027.

Mean concentration is the time-weighted concentration of suspended sediment passing a stream section during a 24-hour day.

Solute is any substance derived from the atmosphere, vegetation, soil, or rocks that is dissolved in water.

Specific conductance is a measure of the ability of a water to conduct an electrical current. It is expressed in micromhos per centimeter at 25°C. Specific conductance is related to the type and concentration of ions in solution and can be used for approximating the dissolved-solids content of the water. Commonly, the concentration of dissolved solids (in milligrams per liter) is about 65 percent of the specific conductance (in micromhos). This relation is not constant from stream to stream, and it may vary in the same source with changes in the composition of the water.

Stage-discharge relation is the relation between gage height (stage) and volume of water per unit of time, flowing in a channel.

Streamflow is the discharge that occurs in a natural channel. Although the term "discharge" can be applied to the flow of a canal, the word "streamflow" uniquely describes the discharge in a surface stream course. The term "streamflow" is more general than "runoff" as streamflow may be applied to discharge whether or not it is affected by diversion or regulation.

Substrate is the physical surface upon which an organism lived.

Natural substrates refers to any naturally occurring emersed or submersed solid surface, such as a rock or tree, upon which an organism lived.

Artificial substrate is a device which is purposely placed in a stream or lake for colonization of organisms. The artificial substrate simplifies the community structure by standardizing the substrate from which each sample is taken. Examples of artificial substrates are basket samplers (made of wire cages filled with clean streamside rocks) and multi-plate samplers (made of hardboard) for benthic organism collection, and plexiglass strips for periphyton collection.

Surface area of a lake is that area outlined on the latest U.S.G.S. topographic map as the boundary of the lake and measured by a planimeter in acres. In localities not covered by topographic maps, the areas are computed from the best maps available at the time planimetered. All areas shown are those for the stage when the planimetered map was made.

Surficial bed material is that part (0.1 to 0.2 ft) of the bed material that is sampled using U.S. Series Bed-Material Samplers.

Suspended (as used in tables of chemical analyses) refers to the amount (concentration) of the total concentration in a water-sediment mixture. The water-sediment mixture is associated with (or sorbed on) that material retained on a 0.45 micrometer filter.

Taxonomy is the division of biology concerned with the classification and naming of organisms. The classification of organisms is based upon a hierarchical scheme beginning with Kingdom and ending with Species at the base. The higher the classification level, the fewer features the organisms have in common. For example, the taxonomy of a particular mayfly, *Hexagenia limbata* is the following:

Kingdom................ Animal
Phylum ....Arthropoda
Class ....Insecta
Order ....Ephemeroptera
Family.............Ephemeridae
Genus................Hexageria
Species......Hexagenia limbata

Time-weighted average is computed by multiplying the number of days in the sampling period by the concentrations of individual constituents for the corresponding period and dividing the sum of the products by the total number of days. A time-weighted average represents the composition of water that would be contained in a vessel or reservoir that had received equal quantities of water from the stream each day for the year.

Tons per acre-foot indicates the dry mass of dissolved solids in 1 acre-foot of water. It is computed by multiplying the concentrataion in milligrams per liter by 0.00136.

Tons per day is the quantity of substance in solution or suspension that passes a stream section during a 24-hour day.

Total load (tons) is the total quantity of any individual constituent, as measured by dry mass or volume, that is dissolved in a specific amount of water (discharge) during a given time. It is computed by multiplying the total discharge, times the mg/L of the constituent, times the factor 0.0027, times the number of days.

Weighted average is used in this report to indicate discharge-weighted average. It is computed by multiplying the discharge for a sampling period by the concentrations of individual constituents for the corresponding period and dividing the sum of the products by the sum of the discharges. A discharge-weighted average approximates the composition of water that would be found in a reservoir containing all the water passing a given location during the water year after thorough mixing in the reservoir.

WDR is used as an abbreviation for "Water-Data Report" in reference to published reports beginning in 1975.

WRD is used as an abbreviation for "Water-Resources Data" in the REVISED RECORDS paragraph to refer to State annual basic-data reports published before 1975.

WSP is used as an abbreviation for "Water-Supply Paper" in references to previously published reports.

DOWNSTREAM ORDER AND STATION NUMBER

Since October 1, 1950, the order of listing hydrologic-station records in Survey reports is in a downstream direction along the main stream. All stations on a tributary entering upstream from a mainstream station are listed before that station. A station on a tributary that enters between two mainstream stations is listed between them. A similar order is followed in listing stations on first rank, second rank, and other ranks of tributaries. The rank of any tributary on which a station is situated with respect to the stream to which it is immediately tributary is indicated by an indention in a list of stations in the front of the report. Each indention represents one rank. This downstream order and system of indention show which stations are on tributaries between any two stations and the rank of the tributary on which each station is situated.

As an added means of identification, each hydrologic station, and partial-record station has been assigned a station number. These are in the same downstream order used in this report. In assigning station numbers, no distinction is made between partial-record and continuous-record stations; therefore, the station number for partial-record station indicates downstream-order position in a list made up of both types of stations. Gaps are left in the series of numbers to allow for new stations that may be established; hence, the numbers are not consecutive. The complete 8-digit number for each station, such as 04058500, which appears just to the left of the station name, includes the 2-digit part number "04" plus the 6-digit downstream order number "058500".

NUMBERING SYSTEM FOR WELLS

Each well is identified by means of (1) a 15-digit number that is based on the grid system of latitude and longitude followed by (2) a local number that is provided for continuity with older reports and for other use as dictated by local needs.

Each well is located as a point on a map by a number based on the universal system of latitude and longitude. In this report, this is the first set of numbers shown for each well. For maximum utility. latitude and longitude numbers are determined to seconds. The first six digits denote degrees. minutes and seconds of north latitude; the next seven digits denote degrees, minutes, and seconds of west longitude. The last to numbers are sequential numbers assigned in the order that the wells were recorded within a designated latitude-longitude grid.

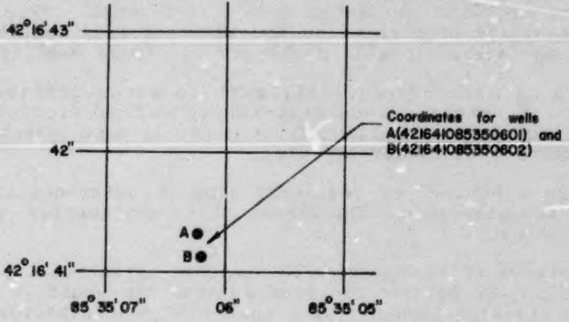


Figure 2. System for numbering wells (latitude and longitude).

The local well number indicates the location of wells within the rectangular subdivision of land with reference to the Michigan meridian and base line. The first two segments of the well number designate township and range, the third segment of the number designates the section and the letters A through D designate successively smaller subdivisions of the section as shown in figure 3. Thus. a well designated as 32N 6E 16CCCB would be located to the nearest 2.5 acres (1 hectare) and would be within the shaded area in section 16. In the event that two or more wells are located in the same 2.5 acre (1 hectare) tract, a sequential number designation follows the letter designations--for example, 16CCCB1. 16CCCB2. 16CCCB3. etc.

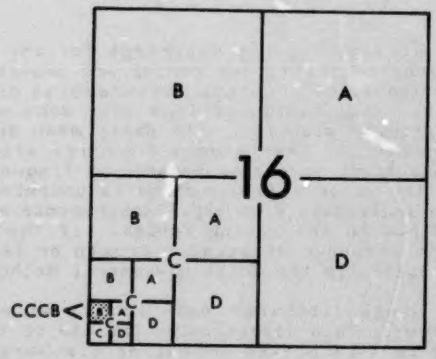


Figure 3. Well numbering system in Michigan.

SPECIAL NETWORKS AND PROGRAMS

Hydrologic bench-mark station is one that provides hydrologic data for a basin in which the hydrologic regimen will likely be governed solely by natural conditions. Data collected at a bench-mark station may be used to separate effects of natural from manmade changes in other basins which have been developed and in which the physiography, climate, and geology are similar to those in the undeveloped bench-mark basin.

National stream-quality accounting network (NASQAN) is a data collection network designated by the U.S. Geological Survey to meet many of the information demands of agencies or groups involved in national or regional water-quality planning anad management. Both accounting and broad-scale monitoring objectives have been incorporated in the network design. Areal configuration of the network is based on river-basin accounting units (identified by 8-digit hydrologic-unit numbers) designated by the Office of Water Data Coordination in consultation with the Water Resources Council. Primary objectives of the network are (1) to depict areal variability of streamflow and water-quality conditions nationwide on a year-by-year basis and (2) to detect and assess long-term changes in stream quality.

Pesticide program is a network of regularly sampled water-quality stations where samples are collected to determine the concentration and distribution of pesticides in streams where potential contamination could result from the application of the commonly used insecticides and herbicides. Operation of the network is a Federal interagency activity.

Radiochemical program is a network of regularly sampled water-quality stations where samples are collected to be analyzed for radioisotopes. The streams that are sampled represent major drainage basins in the conterminous United States.

Tritium network is a network of stations which has been established to provide baseline information on the occurrence of tritium in the Nation's surface waters. In addition to the surface-water stations in the network, tritium data are also obtained at a number of precipitation stations. The purpose of the precipitation stations is to provide an estimate sufficient for hydrologic studies of the tritium input to the United States.

EXPLANATION OF STAGE AND WATER-DISCHARGE

Collection and computation of data

The base data collected at gaging stations consist of records of stage and measurements of discharge of streams or canals, and stage, surface area, and contents of lakes or reservoirs. In addition, observations of factors affecting the stage-discharge relation or the stage-capacity relation, weather records, and other information are used to supplement base data in determining the daily flow or volume of water in storage. Records of stage are obtained from either direct readings on a nonrecording gage or from a water-stage recorder that gives either a continuous graph of the fluctuations or a tape punched at selected time intervals. Measurements of discharge are made with a current meter, using the general methods allotted by the Geological Survey. These methods are described in standard text-books, in Water-Supply Paper 888, and in U.S. Geological Survey Techniques of Water Resources Investigations, book 3, chapter A6.

For stream-gaging stations, rating tables giving the discharge for any stage are prepared from stage-discharge relation curves. If extensions to the rating curves are necessary to express discharge greater than measured, they are made on the basis of indirect measurements of peak discharge (such as slope-area or contracted-opening measurements, computation of flow over dams or weirs), step-backwater techniques, velocity-area studies, and logarithmic plotting. The daily mean discharge is computed from gage heights and rating tables, then the monthly and yearly mean discharge are computed from the daily figures. If the stage-discharge relation is subject to change because of frequent or continual change in the physical features that form the control, the daily mean discharge is computed by the shifting-control method, in which correction factors based on individual discharge measurements and notes by engineers and observers are used in applying the gage heights to the rating tables. If the stage-discharge relation for a station is temporarily changed by the presence of aquatic growth or debris on the control, the daily mean discharge is computed by what is basically the shifting-control method.

At some stream-gaging stations the stage-discharge relation is affected by backwater from reservoirs, tributary streams, or other sources. This necessitates the use of the slope method in which the slope or fall in a reach of the stream is a factor in computing discharge. The slope or fall is obtained by means of an auxiliary gage set at some distance from the base gage. At some stations the stage-discharge relation is affected by changing stage; at these stations the rate of change in stage is used as a factor in computing discharge.

At some northern stream-gaging stations the stage-discharge relation is affected by ice in the winter, and it becomes impossible to compute the discharge in the usual manner. Discharge for periods of ice effect is computed on the basis of the gage-height record and occasional winter discharge measurements. Consideration is given to the available information on temperature and precipitation, notes by gage observers and hydrologists, and comparable records of discharge for other stations in the same or nearby basins.

For a lake or reservoir station, capacity tables giving the contents for any stage are prepared from stage-area relation curves defined by surveys. The application of the stage to the capacity table gives the contents, from which the daily, monthly, or yearly change in contents is computed.

If the stage-capacity curve is subject to changes because of deposition of sediment in the reservoir, periodic resurveys of the reservoir are necessary to define new stage-capacity curves. During the period between reservoir surveys the computed contents may be increasingly in error due to gradual accumulation of sediment.

For some gaging stations there are periods when no gage-height record is obtained or the recorded gage height is so faulty that it cannot be used to compute daily discharges or contents. This happens when the recorder stops or otherwise fails to operate properly, intakes are plugged, the float is frozen in the well, or for various other reasons. For such periods the daily discharges are estimated on the basis of recorded range in stage, prior and subsequent records, discharge measurements, weather records, and comparison with records for other stations in the same or nearby basins. Likewise, daily contents may be estimated on the basis of operator's log, prior and subsequent records, inflow-outflow studies, and other information.

The data in this report generally comprise a description of the station and tabulations of daily and monthly figures. For gaging stations on streams or canals a table showing the daily discharge and monthly and yearly discharge is given. For gaging stations on lakes and reservoirs a monthly summary table of stage and contents or a table showing the daily contents is given. Tables of daily mean gage heights are included for some streamflow stations and for some reservoir stations. Records are published for the water year which begins on October 1 and ends on September 30.

The description of the gaging stations gives the location, drainage area, period of record, notations of revisions of previously published records, type and history of gages, general remarks, average discharge, and extremes of discharge or contents. The location of the gaging station and the drainage area are obtained from the most accurate maps available. River mileage, given under "LOCATION" for some stations, is that determined and used by the Corps of Engineers or other agencies. Periods for which there are published records for the present station or for stations generally equivalent to the present one are given under "PERIOD OF RECORD".

Previously published streamflow records of some stations have been found to be in error on the basis of data or information later obtained. Revisions of such records are usually published along with the current records in one of the annual or compilation reports. In order to make it easier to find such revised records, a paragraph headed "REVISED RECORDS" has been added to the description of all stations for which revised records have been published. Listed therein are all the reports in which revisions have been published, each followed by the water years for which figures are revised in that report. In listing the water years only one number is given; for instance, 1965 stands for the water year Oct. 1, 1964, to September 30, 1965. If no daily, monthly, or annual figures of discharge are affected by the revision, the fact is brought out by notations after the year dates as follows: "(M)" means that only the instantaneous maximum discharge was revised; "(m)" that only the instantaneous minimum was revised; and "(P)" that only peak discharges were revised. If the drainage area has been revised, the report in which the revised figure was first published is given. It should be noted that for all stations for which cubic feet per second per square mile and runoff in inches are published, a revision of the drainage area necessitates corresponding revision of all figures based on the drainage area. Revised figures of cubic feet per second per square mile and runoff in inches resulting from a revision of the drainage area only, are usually not published in the annual series of reports.

The type of gage currently in use; the datum of the present gage referred to National Geodetic Vertical Datum; and a condensed history of the types, locations, and datums of previous gages used during the period of record are given under "GAGE". National Geodetic Vertical Datum is explained in "DEFINITION OF TERMS" on page 5.

Information pertaining to the accuracy of the discharge records and to conditions which affect the natural flow of the gaging station is given under "REMARKS". For reservoir stations, information on the dam forming the reservoir, the capacity, outlet works, spillway, and purpose and use of the reservoir is given under "REMARKS".

The average discharge for the number of years indicated is given under "AVERAGE DISCHARGE"; it is not given for stations having fewer than 5 complete years of record or for stations where changes in water development during the period of record cause the figure to have little significance. Under "EXTREMES" are given first, the extremes for the period of record, second, information available outside the period of record, and last, those for the current year. Unless otherwise qualified, the maximum discharge (or contents) is the instantaneous maximum corresponding to the crest stage obtained by use of a water-stage recorder (graphic or digital), a crest-stage gage, or a nonrecording gage read at the time of the crest. If the maximum gage height did not occur on the same day as the maximum discharge (or contents), it is given separately. Similarly, the minimum is the instantaneous minimum unless otherwise qualified. For some stations, peak discharges are listed with "EXTREMES FOR THE CURRENT YEAR". If they are, all independent peaks above the selected base are published in tabular format with the time of occurrence and corresponding gage heights, including the maximum for the year. The base discharge, which is given in the table heading, is selected so that an average of about three peaks a year will be presented. Peak discharges are not published for any canals, ditches, drains, or for any stream for which the peaks are subject to substantial control by man. Time of day is expressed in 24-hour local standard time; for example, 12:30 a.m. is 0030, 1:30 p.m. is 1330. The minimums for these stations are published in a separate paragraph following the table of peaks.

The daily table for stream-gaging stations gives the mean discharge for each day and is followed by monthly and yearly summaries. In the monthly summary below the daily table, the line headed "TOTAL" gives the sum of the daily figures. The line headed "MEAN" gives the average flow in cubic feet per second during the month. The lines headed "MAX" and "MIN" give the maximum and minimum daily discharges, respectively, for the month. Discharge for the month also may be expressed in cubic feet per second per square mile (line headed "CFSM"), or in inches (line headed "IN."), or in acre-feet (line headed "AC-FT"). Figures for cubic feet per second per square mile and runoff in inches are omitted if there is extensive regulation or diversion, if the drainage area includes large noncontributing areas, or if the average annual rainfall over the drainage basin is usually less than 20 inches. In the yearly summary below the monthly summary, the figures shown are the appropriate daily discharges for the calendar and water years.

Footnotes to the table of daily discharges are introduced by the word "NOTE." Footnotes are used to indicate periods for which the discharge is computed or estimated by special methods because of no gage-height record, backwater from various sources, or other unusual conditions. Periods of no gage-height record are indicated if the period is continuous for a month or more or includes the maximum discharge for the year. Periods of backwater from an unusual source, of indefinite stage-discharge relation, or of any other unusual condition at the gage site are indicated only if they are a month or more in length and the accuracy of the records is affected. Days on which the stage-discharge relation is affected by ice are not indicated. The methods used in computing discharge for various unusual conditions have been explained in preceding paragraphs.

For most gaging stations on lakes and reservoirs the data presented comprise a description of the station and a monthly summary table of stage and contents. For some reservoirs a table showing daily contents or stage is given. A skeleton table of capacity at given stages is published for most reservoirs for which records are published on a daily basis, but is not published for reservoirs for which only monthly data are given.

Data collected at partial-record stations follow the information for continuous-record sites. Data for partial-record discharge stations are presented in two tables. The first is a table of discharge measurements at low-flow partial-record stations, and the second is a table of annual maximum stage and discharge at crest-stage stations. The tables of partial-record stations are followed by a listing of discharge measurements made at sites other than continuous-record or partial-record stations. Occasionally, a series of discharge measurements are made within a short time period to investigate the seepage gains or losses along a reach of a stream or to determine the low-flow characteristics of an area. Such measurements are also given in special tables following the tables of partial-record stations.

Accuracy of data

The accuracy of streamflow data depends primarily on (1) the stability of the stage-discharge relation or, if the control is unstable, the frequency of discharge measurements, and (2) the accuracy of observations of stage, measurements of discharge, and interpretation of records.

The station description under "REMARKS" states the degree of accuracy of the records. "Excellent" means that about 95 percent of the daily discharges are within 5 percent; "good" within 10 percent; and "fair" within 15 percent. "Poor" means that daily discharges have less than "fair" accuracy.

Figures of daily mean discharge in this report are shown to the nearest hundredth of a cubic foot per second for discharges of less than 1 cfs; to tenths between 1.0 and 10 cfs; to whole numbers between 10 and 1,000 cfs; and to 3 significant figures above 1,000 cfs. The number of significant figures used is based solely on the magnitude of the figure. The same rounding rules apply to discharge figures listed for partial-record stations.

Discharge at many stations, as indicated by the monthly mean, may not reflect natural runoff due to the effects of diversion, consumption, regulation by storage, increase or decrease in evaporation due to artificial causes, or to other factors. For such stations, figures of cubic feet per second per square mile and of runoff in inches are not published unless satisfactory adjustments can be made for diversions, for changes in contents of reservoirs, or for other changes incident to use and control. Evaporation from a reservoir not included in the adjustments for changes in reservoir contents, unless it is so stated. Even at those stations where adjustments are made, large errors in computed runoff may occur if adjustments or losses are large in comparison with the observed discharge.

Other data available

Information of a more detailed nature than that published for most of the gaging stations, such as observations of water temperatures, discharge measurements, gage-height records, and rating tables, is on file in the district office. Also, most gaging-station records are available in computer-usable form and many statistical analyses have been made.

Information on the availability of unpublished data or statistical analyses may be obtained from the district office.

EXPLANATION OF WATER QUALITY RECORDS

Collection and examination of data

Surface-water samples for analyses usually are collected at or near gaging stations. The quality-of-water records are given immediately following the discharge records at these stations.

The descriptive heading for water-qualilty records gives the period of record for all water-quality data; the period of daily record for parameters that are measured on a daily basis (specific conductance, pH, dissolved oxygen, water temperature. sediment discharge, etc.); extremes for period of daily record; extremes for the current year; and general remarks.

Information pertaining to the accucracy of some water-quality records are preceeded by a "remark code." The following are explanations of "remark codes" found accompanying water-quality records: "E" estimated; "K" results based on colony outside the acceptable range (NON-IDEAL COLONY COUNT); "ND" not detected.

For ground-water records, no descriptive statements are given; however, the well number, depth of well, date of sampling and/or other pertinent data are given in the table containing the chemical analyses of the ground water.

REVISIONS--If errors in published water-quality records are discovered after publication, appropriate updates are made to the Water-Quality File in the U.S. Geological Survey's computerized data system, WATSTORE, and subsequently by monthly transfer of update transactions to the U.S. Environmental Protection Agency's STORET system. Because the usual volume of updates makes it impractical to document individual changes in the State data-report series or elsewhere, potential users of U.S. Geological Survey water-quality data are encouraged to obtain all required data from the appropriate computer file to insure the most recent updates.

Water analysis

Most methods for collecting and analyzing water sample are described in the U.S. Geological Survey Techniques for Water Resources Investigations listed on a following page.

One sample can define adequately the water quality at a given time if the mixture of solutes thoughout the stream cross section is homogeneous. However, the concentration of solutes at different locations in the cross section may vary widely with different rates of water discharge, depending on the source of material and the turbulence and mixing of the stream. Some streams must be sampled through several vertical sections to obtain a representative sample needed for an accurate mean concentration and for use in calculating load.

Chemical-quality data published in this report are considered to be the most representative values available for the stations listed. The values reported represent water-quality conditions at the time of sampling as much as possible, consistent with available sampling techniques and methods of analysis. In the rare case where an apparent inconsistency exists between a reported pH value and the relative abundance of carbon dioxide species (carbonate and bicarbonate), the inconsistency is the result of a slight uptake of carbon dioxide from the air by the sample between measurement of pH in the field and determination of carbonate and bicarbonate in the laboratory.

For chemical-quality stations equipped with digital monitors, the records consist of daily maximum, minimum, and mean values for each constituent measured and are based upon hourly punches beginning at 0100 hours and ending at 2400 hours for the day of record. More detailed records (hourly values) may be obtained from the district office.

Water temperature

Water temperatures are measured at most of the water-quality stations. In addition, water temperatures are taken at time of discharge measurements for water-discharge stations. For stations where water temperatures are taken manually once or twice daily, the water temperatures are taken at about the same time each day. Large streams have a small daily temperature change; shallow streams may have a daily range of several degrees and may follow closely the changes in air temperature. Some streams may be affected by waste-heat discharge.

At stations where recording instruments are used, either mean temperatures or maximum and minimum temperatures for each day are published.

Sediment

Suspended-sediment concentrations are determined from samples collected by using depth-integrating samplers. Samples usually are obtained at several verticals in the cross section, or a single sample may be obtained at a fixed point and a coefficient applied to determine the mean concentration in the cross sections.

During periods of rapidly changing flow or rapidly changing concentration. samples may have been collected more frequently (twice daily or, in some instances, hourly). The published sediment discharges for days of rapidly changing flow or concentration were computed by the subdivided day method (time-discharge weighted average). Therefore, for those days when the published sediment discharge value differs from the value computed as the product of discharge times mean concentration times 0.0027, the reader can assume that the sediment discharge for that day was computed by the subdivided day method. For periods when no samples are collected, daily loads of suspended sediment were estimated on the basis of water discharge, sediment concentrations observed immediately before and after the periods, and suspended-sediment loads for other periods of similar discharge.

At other stations, suspended-sediment samples are collected periodically at many verticals in the stream cross section. Although data collected periodically may represent conditions only at the time of observation, such data are useful in estblishing seasonal relations between quality and streamflow in predicting long-term sediment-discharge characteristics of the stream.

In addition to the records of the quantities of suspended sediment, records of periodic measurements of the particle-size distribution of the suspended sediment and bed material are included.

EXPLANATION OF GROUND-WATER LEVEL RECORDS

Collection of the data

Only ground-water level data from a basic national network of observation wells are published herein. This basic network contains observation wells so located (figure 9) that the most significant data are obtained from the fewest wells in the most important aquifers.

Each well is identified by means of (1) a 15-digit number that is based on latitude and longitude. and (2) a local number that is provided for local needs. See figures 2 and 3.

Measurements are made in many types of wells under varying conditions of access and of different temperatures, hence neither the method of measurement nor the equipment can be standardized. At each observation well, however, the equipment and techniques used are those that will insure that measurements at each well are consistent.

Water-level measurements in this report are given in feet with reference to either mean sea level (msl) or land-surface datum (lsd). Mean sea level is the datum plane on which the national network of precise levels is based; land-surface datum is a datum plane that is approximately at land surface at each well. If known, the altitude of the land-surface datum above mean sea level is given in the well description. The height of the measuring point (MP) above or below land-surface datum is given in each well description. Water levels in wells equipped with recording gages are reported for every fifth day and the end of each month (EOM).

Water levels are reported to as many significant figures as can be justified by the local conditions. For example, in a measurement of a depth to water of several hundred feet, the error of determining the absolute value of the total depth to water may be a few tenths of a foot, whereas the error in determining the net change of water level between successive measurements may be only a hundredth or a few hundredths of a foot. For lesser depths to water, the accuracy is greater. Accordingly, most measurements are reported to a hundredth of a foot, but some are given only to a tenth of a foot or a larger unit.

ACCESS TO WATSTORE DATA

The National WATer Data STOrage and REtrieval System (WATSTORE) was established for handling water data collected through the activities of the U.S. Geological Survey and to provide for more effective and efficient means of releasing the data to the public. The system is operated and maintained on the central computer facilities of the Survey at its National Center in Reston, Virginia.

WATSTORE can provide a variety of useful products ranging from simple data tables to complex statistical analyses. A minimal fee, plus the actual computer cost incurred in producing a desired product, is charged to the requester. Information about the availability of specific types of data, the acquisition of data or products, and user charges can be obtained locally from each of the Water Resources Division's district offices (see address given on the back of the title page).

General inquires about WATSTORE may be directed to:

Chief Hydrologist
U.S. Geological Survey
437 National Center
Reston, Virginia 22092

PUBLICATIONS ON TECHNIQUES OF WATER-RESOURCES INVESTIGATIONS

Thirty-seven manuals by the U.S. Geological Survey have been published to date in the series on techniques describing procedures for planning and executing specialized work in water-resources investigations. The material is grouped under major subject headings called books and is further divided into sections and chapters. For example, Section A of Book 3 (Applications of Hydraulics) is on surface water. The chapter, the unit of publication, is limited to a narrow field of subject matter. This format permits flexibility in revision and publication as the need arises. The reports listed below are for sale by the U.S. Geological Survey, Branch of Distribution, 604 South Pickett St., Alexandria, VA 22304 (authorized agent of the Superintendent of Documents, Government Printing Office).

NOTE: When ordering any of these publications, please give the title, book number, chapter number, and "U.S. Geological Survey Techniques of Water-Resources Investigations".

1-D1. *Water temperature--influential factors, field measurement, and data presentation*, by H. H. Stevens, Jr., J. F. Ficke, and G. F. Smoot: USGS--TWRI Book 1, Chapter D1. 1975. 65 pages.

1-D2. *Guidelines for collection and field analysis of ground-water samples for selected unstable constituents*, by W. W. Wood: USGS--TWRI Book 1, Chapter D2. 1976. 24 pages.

2-D1. *Application of surface geophysics to ground-water investigations*, by A. A. R. Zohdy, G. P. Eaton, and D. R. Mabey: USGS--TWRI Book 2, Chapter D1. 1974. 116 pages.

2-E1. *Application of borehole geophysics to water-resources investigations*, by W. S. Keys and L. M. MacCary: USGS--TWRI Book 2, Chapter E1. 1971. 126 pages.

3-A1. *General field and office procedures for indirect discharge measurements*, by M. A. Benson and Tate Dalrymple: USGS--TWRI Book 3, Chapter A1. 1967. 30 pages.

3-A2. *Measurement of peak discharge by the slope-area method*, by Tate Dalrymple and M. A. Benson: USGS--TWRI Book 3, Chapter A2. 1967. 12 pages.

3-A3. *Measurement of peak discharge at culverts by indirect methods*, by G. L. Bodhaine: USGS--TWRI Book 3, Chapter A3. 1968. 60 pages.

3-A4. *Measurement of peak discharge at width contractions by indirect methods*, by H. F. Matthai: USGS--TWRI Book 3, Chapter A4. 1967. 44 pages.

3-A5. *Measurement of peak discharge at dams by indirect methods*, by Harry Hulsing: USGS--TWRI Book 3, Chapter A5. 1967. 29 pages.

3-A6. *General procedure for gaging streams*, by R. W. Carter and Jacob Davidian: USGS--TWRI Book 3, Chapter A6. 1968. 13 pages.

3-A7. *Stage measurements at gaging stations*, by T. J. Buchanan and W. P. Somers: USGS--TWRI Book 3, Chapter A7. 1968. 28 pages.

3-A8. *Discharge measurements at gaging stations*, by T. J. Buchanan and W. P. Somers: USGS--TWRI Book 3, Chapter A8. 1969. 65 pages.

3-A9. *Measurement of time of travel and dispersion in streams by dye tracing*, by E. F. Hubbard, F. A. Kilpatrick, L. A. Martens, and J. F. Wilson, Jr.: USGS--TWRI Book 3, Chapter A9. 1982. 44 pages.

3-A11. *Measurement of discharge by moving-boat method*, by G. F. Smoot and C. E. Novak: USGS--TWRI Book 3, Chapter A11. 1969. 22 pages.

3-B1. *Aquifer-test design, observation, and data analysis*, by R. W. Stallman: USGS--TWRI Book 3, Chapter B1. 1971. 26 pages.

3-B2. *Introduction to ground-water hydraulics, a programed text for self-instruction*, by G. D. Bennett: USGS--TWRI Book 3, Chapter B2. 1976. 172 pages.

3-B3. *Type curves for selected problems of flow to wells in confined aquifers*, by J. E. Reed: USGS--TWRI Book 3, Chapter B3. 1980. 106 pages.

3-C1. *Fluvial sediment concepts*, by H. P. Guy: USGS--TWRI Book 3, Chapter C1. 1970. 55 pages.

3-C2. *Field methods for measurement of fluvial sediment*, by H. P. Guy and V. W. Norman: USGS--TWRI Book 3, Chapter C2. 1970. 59 pages.

3-C3. *Computation of fluvial-sediment discharge*, by George Porterfield: USGS--TWRI Book 3, Chapter C3. 1972. 66 pages.

4-A1. *Some statistical tools in hydrology*, by H. C. Riggs: USGS--TWRI Book 4, Chapter A1. 1968. 39 pages.

4-A2. *Frequency curves*, by H. C. Riggs: USGS--TWRI Book 4, Chapter A2. 1968. 15 pages.

4-B1. *Low-flow investigations*, by H. C. Riggs: USGS--TWRI Book 4, Chapter B1. 1972. 18 pages.

4-B2. *Storage analyses for water supply*, by H. C. Riggs and C. H. Hardison: USGS--TWRI Book 4, Chapter B2. 1973. 20 pages.

4-B3. *Regional analyses of streamflow characteristics*, by H. C. Riggs: USGS--TWRI Book 4, Chapter B3. 1973. 15 pages.

4-D1. *Computation of rate and volume of stream depletion by wells*, by C. T. Jenkins: USGS--TWRI Book 4, Chapter D1. 1970. 17 pages.

5-A1. *Methods for determination of inorganic substances in water and fluvial sediments*, by M. W. Skougstad and others, editors: USGS--TWRI Book 5, Chapter A1. 1979. 626 pages.

5-A2. *Determination of minor elements in water by emission spectroscopy*, by P. R. Barnett and E. C. Mallory, Jr.: USGS--TWRI Book 5, Chapter A2. 1971. 31 pages.

5-A3. *Methods for analysis of organic substances in water*, by D. F. Goerlitz and Eugene Brown: USGS--TWRI Book 5, Chapter A3. 1972. 40 pages.

5-A4. *Methods for collection and analysis of aquatic biological and microbiological samples*, edited by P. E. Greeson, T. A. Ehlke, G. A. Irwin, B. W. Lium, and K. V. Slack: USGS--TWRI Book 5, Chapter A4. 1977. 332 pages.

5-A5. *Methods for determination of radioactive substances in water and fluvial sediments*, by L. L. Thatcher, V. J. Janzer, and K. W. Edwards: USGS--TWRI Book 5, Chapter A5. 1977. 95 pages.

5-C1. *Laboratory theory and methods for sediment analysis*, by H. P. Guy: USGS--TWRI Book 5, Chapter C1. 1969. 58 pages.

7-C1. *Finite difference model for aquifer simulation in two dimensions with results of numerical experiments*, by P. C. Trescott, G. F. Pinder, and S. P. Larson: USGS--TWRI Book 7, Chapter C1. 1976. 116 pages.

7-C2. *Computer model of two-dimensional solute transport and dispersion in ground water*, by L. F. Konikow and J. D. Bredehoeft: USGS--TWRI Book 7, Chapter C2. 1978. 90 pages.

7-C3. *A model for simulation of flow in singular and interconnected channels*, by R. W. Schaffranek, R. A. Baltzer, and D. E. Goldberg: USGS--TWRI Book 7, Chapter C3. 1981. 110 pages.

8-A1. *Methods of measuring water levels in deep wells*, by M. S. Garber and F. C. Koopman: USGS--TWRI Book 8, Chapter A1. 1968. 23 pages

8-B2. *Calibration and maintenance of vertical-axis type current meters*, by G. F. Smoot and C. E. Novak: USGS--TWRI Book 8, Chapter B2. 1968. 15 pages.

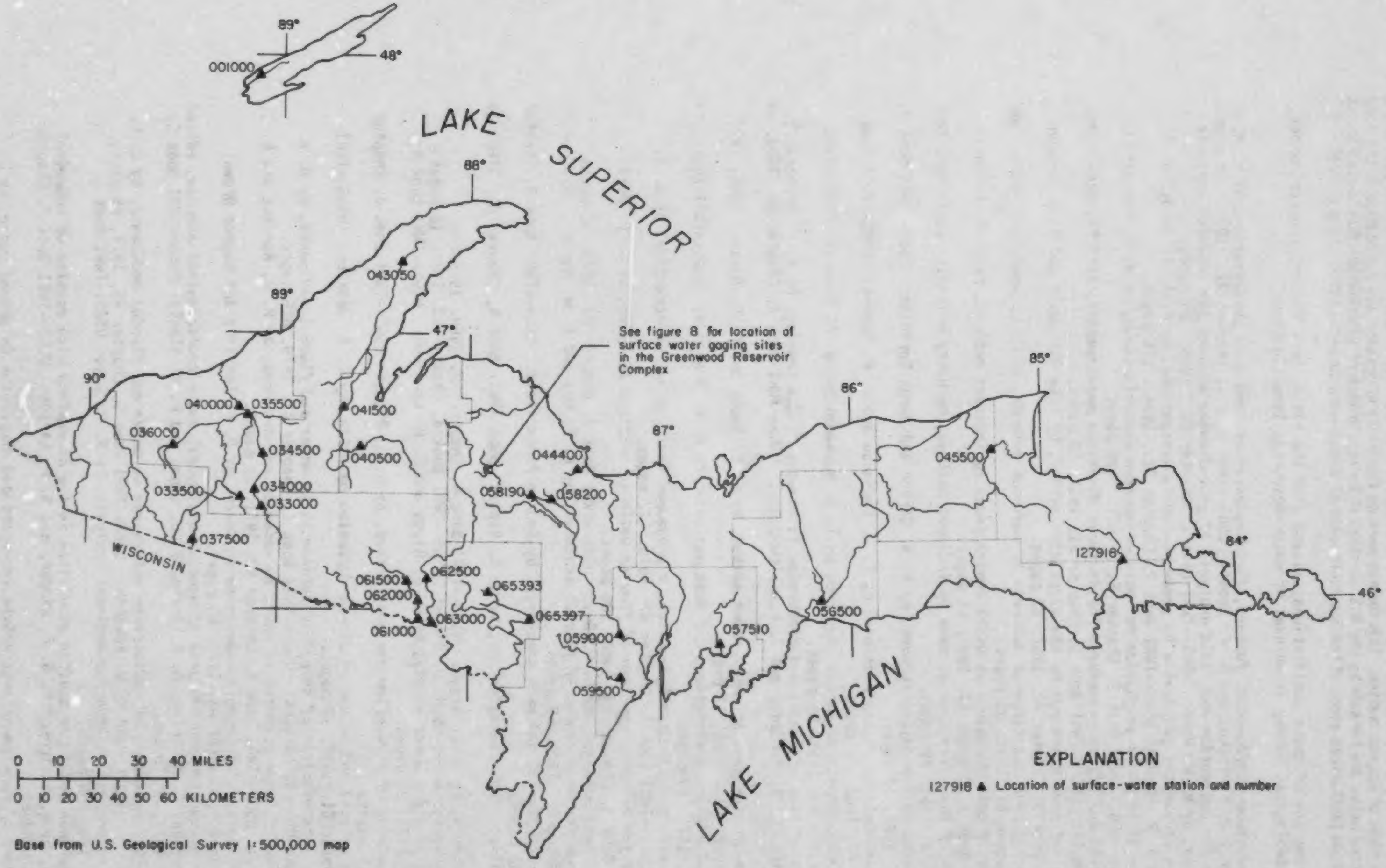
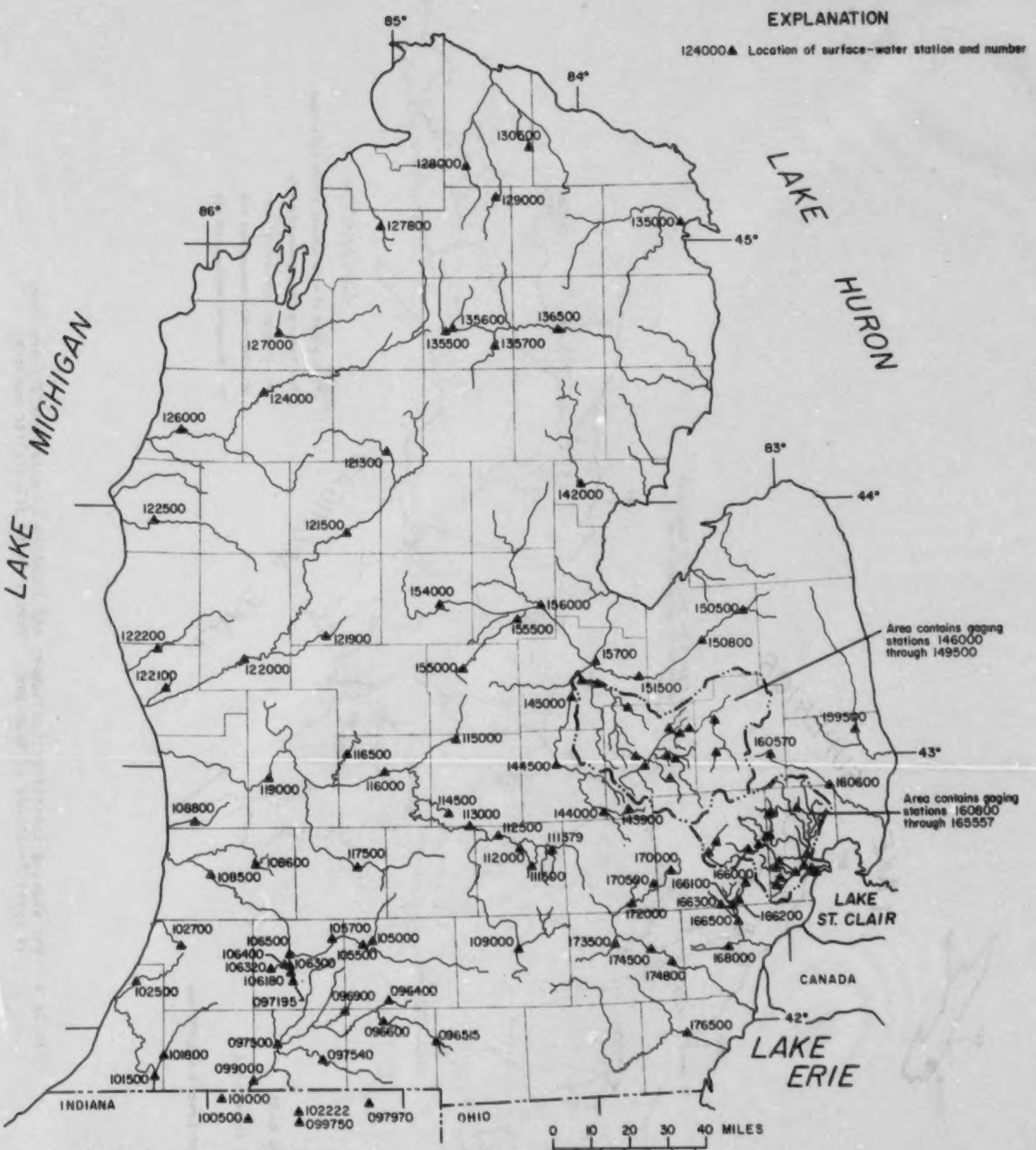
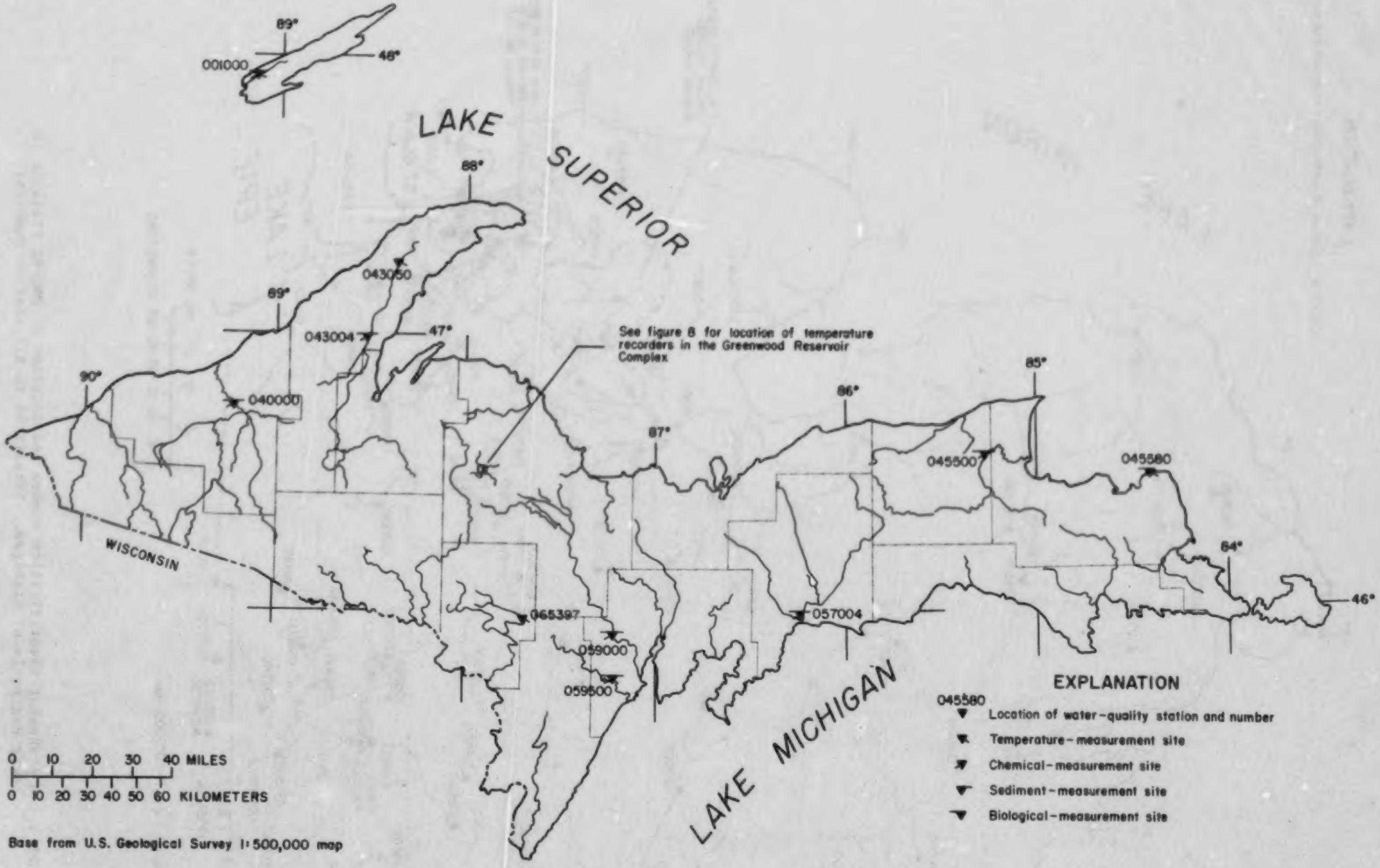

001000
89°
48°
LAKE SUPERIOR
88°
89°
90°
47°
043050
040000
035500
036000
034500
033500
034000
033000
037500
041500
040500
See figure 8 for location of surface water gaging sites in the Greenwood Reservoir Complex
044400
058190
058200
87°
86°
85°
84°
46°
045500
127918
061500
062000
062500
065393
061000
063000
065397
059000
059500
057510
056500
WISCONSIN
LAKE MICHIGAN
EXPLANATION
127918 ▲ Location of surface-water station and number
0 10 20 30 40 MILES
0 10 20 30 40 50 60 KILOMETERS
Base from U.S. Geological Survey 1:500,000 map

FIGURE 4.--Map showing identification number and location of gaging stations in Upper Peninsula of Michigan. (Prefix 04 to all station numbers)


EXPLANATION
124000▲ Location of surface-water station and number
85°
84°
86°
83°
45°
44°
43°
42°
LAKE MICHIGAN
LAKE HURON
LAKE ST. CLAIR
LAKE ERIE
CANADA
INDIANA
OHIO
130600
128000
129000
127800
135000
127000
135600
135500
135700
136500
124000
126000
121300
142000
122500
121500
154000
156000
155500
150500
150800
122200
121900
122000
155000
15700
122100
151500
145000
159500
115000
160570
116500
144500
160600
119000
116000
114500
113000
144000
143900
108800
112500
111379
112000
111500
108600
117500
108500
170000
170590
166100
166000
172000
166300
166500
166200
102700
105700
105000
106500
106400
106320
106300
106500
109000
173500
174500
174800
168000
106180
102500
097195
096900
096400
096600
096515
097300
176500
101800
097540
099000
101500
101000
100500
102222
099750
097970
Area contains gaging stations 146000 through 149500
Area contains gaging stations 160800 through 165557
0 10 20 30 40 MILES
0 10 20 30 40 50 60 KILOMETERS

Base from U.S. Geological Survey 1:500,000 map

FIGURE 5.--Map showing identification number and location of gaging stations in Lower Peninsula of Michigan. (Prefix 04 to all station numbers)


89°
48°
001000
LAKE SUPERIOR
88°
043050
89°
043004
47°
90°
040000
See figure 8 for location of temperature recorders in the Greenwood Reservoir Complex
86°
85°
87°
045500
045580
84°
46°
WISCONSIN
065397
059000
059500
057004
LAKE MICHIGAN
0 10 20 30 40 MILES
0 10 20 30 40 50 60 KILOMETERS
EXPLANATION
045580
Location of water-quality station and number
Temperature-measurement site
Chemical-measurement site
Sediment-measurement site
Biological-measurement site

Base from U.S. Geological Survey 1:500,000 map

FIGURE 6.--Map showing identification number and location of water-quality stations in Upper Peninsula of Michigan. (Prefix 04 to all station numbers)

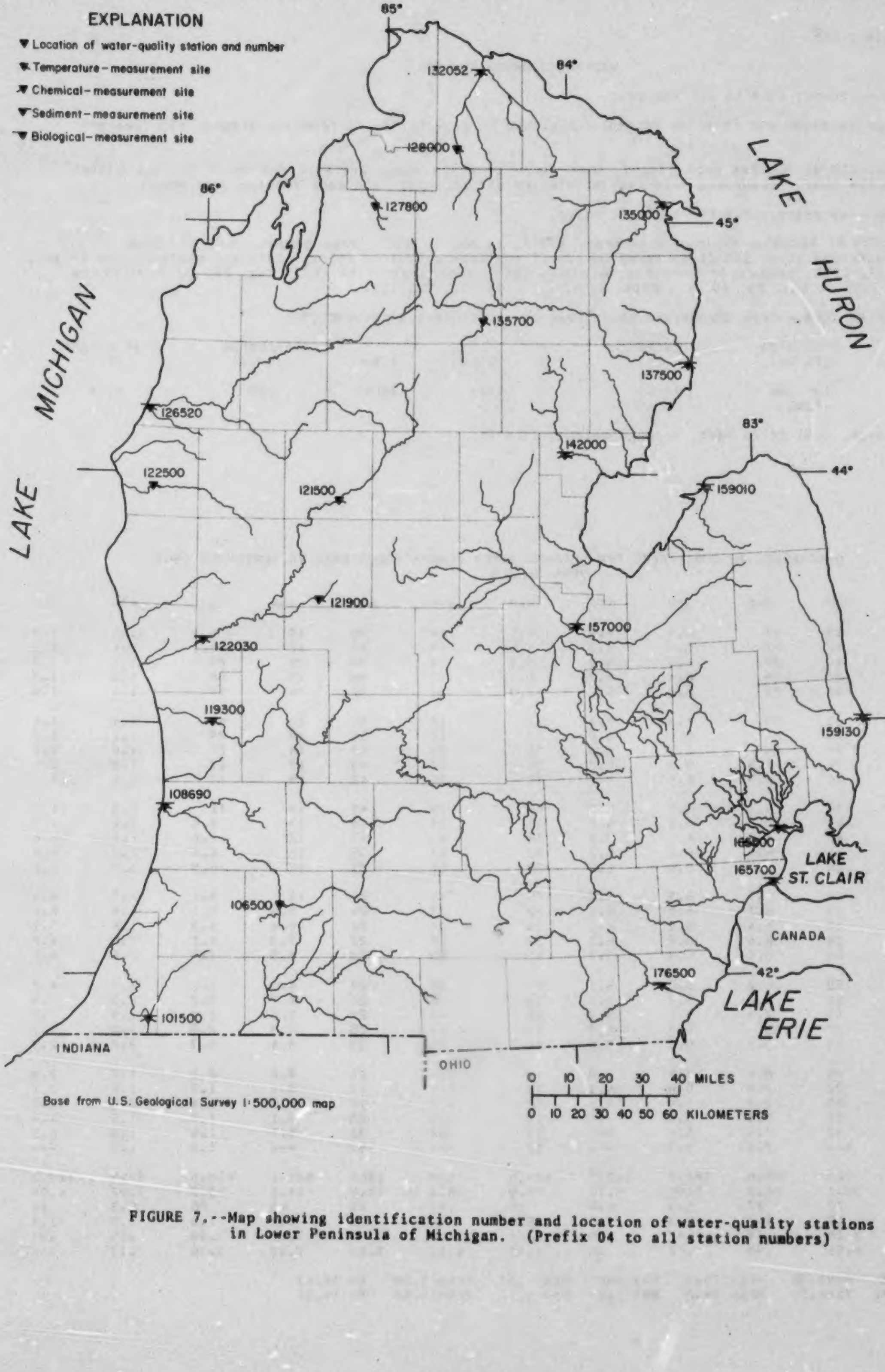

EXPLANATION
Location of water-quality station and number
Temperature-measurement site
Chemical-measurement site
Sediment-measurement site
Biological-measurement site
85°
84°
86°
83°
45°
44°
43°
42°
132052
128000
127800
135000
135700
137500
126520
122500
121500
142000
159010
121900
157000
122030
119300
159130
108690
166000
165700
106500
176500
101500
LAKE HURON
LAKE MICHIGAN
LAKE ST. CLAIR
CANADA
LAKE ERIE
INDIANA
OHIO
0 10 20 30 40 MILES
0 10 20 30 40 50 60 KILOMETERS
Base from U.S. Geological Survey 1:500,000 map

FIGURE 7.--Map showing identification number and location of water-quality stations in Lower Peninsula of Michigan. (Prefix 04 to all station numbers)

04001000 WASHINGTON CREEK AT WINDIGO, MI
(Hydrologic bench-mark station)

LOCATION.--Lat 47°55'23", long 89°08'42", in NW1/4 sec.28, T.64 N., R.38 W., Keweenaw County, Isle Royale National Park, Hydrologic Unit 04020300, on left bank 0.8 mi northeast of Windigo, and 35 mi southwest of Rock Harbor.

DRAINAGE AREA.--13.2 mi^2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1964 to current year.

GAGE.--Water-stage recorder and concrete control. Altitude of gage is 605 ft from topographic map (nearest 5 ft).

REMARKS.--Water-discharge records good except those above 80 ft^3/s which are fair, and those for the winter period, which are poor. Recording rain gage at station and capacity rain gage located near mouth.

AVERAGE DISCHARGE.--19 years, 17.4 ft^3/s, 17.90 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 480 ft^3/s May 1, 1972, gage height, 6.82 ft, from rating curve extended above 160 ft^3/s based on runoff characteristics of nearby stations; maximum gage height, 6.88 ft Jan. 13, 1975, backwater from ice; minimum daily discharge, 0.44 ft^3/s Aug. 25, 1977; minimum gage height, 2.55 ft Aug. 29, 30, 31, Sept. 2, 3, 7, 9, 10, 11, 12, 1976.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 110 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Mar. 10	1300	ice jam	*5.51	July 3	2400	124	4.74
Apr. 27	2400	*165	5.15				

Minimum discharge, 0.91 ft^3/s Sept. 8, gage height, 2.66 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	28	13	17	6.9	5.2	5.5	14	96	40	6.3	1.6	1.3
2	30	12	21	6.7	5.2	5.5	17	92	31	6.1	1.4	1.3
3	42	14	27	6.5	5.2	5.5	19	99	25	29	1.9	1.3
4	40	37	26	6.4	5.2	6.1	17	84	25	88	1.8	1.3
5	38	34	23	6.3	5.2	7.0	17	69	26	69	1.6	1.4
6	55	30	19	6.3	5.2	12	18	61	23	43	1.4	1.4
7	76	25	14	6.3	5.2	20	16	55	20	29	1.2	1.2
8	52	26	10	6.3	5.0	35	20	50	18	22	1.4	1.1
9	40	24	7.5	6.3	5.0	60	27	43	17	17	1.2	2.0
10	70	24	6.5	6.4	5.0	70	30	40	15	13	2.8	15
11	63	38	5.7	6.5	5.0	55	29	40	14	11	5.3	11
12	69	41	5.3	6.2	5.0	45	38	40	13	8.8	3.0	7.3
13	61	46	6.4	6.1	5.1	38	43	43	12	7.6	2.2	5.6
14	46	34	6.1	6.0	5.2	33	47	35	11	6.6	2.0	4.9
15	34	26	6.1	6.0	5.1	28	57	31	11	6.0	1.8	4.2
16	27	22	6.1	5.9	5.2	25	41	27	11	5.4	1.7	6.1
17	23	19	6.1	5.8	5.1	22	37	24	9.5	5.1	1.6	6.1
18	20	18	6.4	5.8	5.1	20	30	22	8.4	4.3	1.5	5.7
19	23	29	6.6	5.8	5.1	19	28	20	7.3	4.1	2.4	4.8
20	21	65	6.5	5.8	5.1	18	28	20	6.5	3.9	2.0	4.5
21	20	72	6.2	5.8	5.1	16	32	20	6.1	3.6	1.9	4.2
22	19	52	6.2	5.7	5.1	16	36	20	8.7	3.2	2.5	3.5
23	19	40	7.3	5.6	5.2	15	49	27	9.5	2.9	1.9	3.2
24	20	33	13	5.5	5.0	14	64	25	7.3	2.6	1.9	3.2
25	19	28	9.2	5.5	5.0	14	75	23	8.4	2.3	2.0	2.9
26	17	25	8.6	5.5	5.0	13	111	20	9.8	2.1	1.8	2.6
27	15	22	7.9	5.4	5.1	13	142	17	8.1	1.9	1.6	2.1
28	14	20	7.8	5.4	5.4	12	137	16	8.7	1.8	1.5	2.0
29	16	18	7.6	5.4	---	12	130	23	6.1	1.7	1.5	4.8
30	16	17	7.4	5.4	---	12	109	33	5.7	1.6	1.6	6.3
31	15	---	7.1	5.3	---	12	---	50	---	1.6	1.5	---
TOTAL	1048	904	320.6	184.8	143.3	678.6	1458	1265	422.1	410.5	59.5	122.3
MEAN	33.8	30.1	10.3	5.96	5.12	21.9	48.6	40.8	14.1	13.2	1.92	4.08
MAX	76	72	27	6.9	5.4	70	142	99	40	88	5.3	15
MIN	14	12	5.3	5.3	5.0	5.5	14	16	5.7	1.6	1.2	1.1
CFSM	2.56	2.28	.78	.45	.39	1.66	3.68	3.09	1.07	1.00	.15	.31
IN.	2.95	2.55	.90	.52	.40	1.91	4.11	3.56	1.19	1.16	.17	.34

CAL YR 1982 TOTAL 6697.36 MEAN 18.3 MAX 298 MIN .97 CFSM 1.39 IN 18.87
WTR YR 1983 TOTAL 7016.70 MEAN 19.2 MAX 142 MIN 1.1 CFSM 1.46 IN 19.77

04001000 WASHINGTON CREEK AT WINDIGO, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1965 to current year.

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: October 1964 to current year.

INSTRUMENTATION.--Temperature recorder since Oct. 20, 1964.

REMARKS.--In addition to the daily temperature record, quarterly samples were collected during the year. Clock stopped July 9-27 (range in temperature 16.0 to 22.0°C), no record Sept. 25-30.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum, 22.5°C July 29, Aug. 6, 1983; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum, 22.5°C July 29, Aug. 6; minimum, 0.0°C on many days during winter period.

WATER QUALITY DATA, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DATE	TIME	STREAMFLOW, INSTANTANEOUS (CFS)	SPECIFIC CONDUCTANCE (UMHOS)	PH (STANDARD UNITS)	TEMPERATURE (DEG C)	TURBIDITY (NTU)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)	COLIFORM, FECAL, 0.7 UM-MF (COLS./100 ML)	STREPTOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)
OCT 21...	1515	19	42	7.4	3.5	1.6	12.3	94	--	110
FEB 16...	1500	5.0	130	7.6	.5	1.4	13.6	96	K2	K350
MAY 10...	1430	38	68	7.5	7.5	1.3	11.6	98	K3	240
JUL 27...	1345	1.8	180	7.8	19.0	1.5	8.4	92	60	--

DATE	HARDNESS (MG/L AS CACO3)	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	PERCENT SODIUM	SODIUM ADSORPTION RATIO	POTASSIUM, DISSOLVED (MG/L AS K)	ALKALINITY LAB (MG/L AS CACO3)	CARBON DIOXIDE DISSOLVED (MG/L AS CO2)
OCT 21...	42	11	3.5	2.5	11	.2	<.1	35	2.7
FEB 16...	68	18	5.5	3.3	0	.2	.3	64	3.1
MAY 10...	34	9.2	2.6	1.4	8	.1	.4	29	1.7
JUL 27...	94	26	7.1	5.1	10	.2	.6	86	2.6

DATE	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, DISSOLVED (MG/L AS F)	SILICA, DISSOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	SOLIDS, DISSOLVED (TONS PER AC-FT)	SOLIDS, DISSOLVED (TONS PER DAY)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N)
OCT 21...	14	2.3	<.1	10	102	65	.14	5.2	<.10
FEB 16...	12	2.7	<.1	15	95	95	.13	1.3	.12
MAY 10...	11	1.2	<.1	8.8	64	52	.09	6.6	<.10
JUL 27...	12	6.4	<.1	14	139	123	.19	.68	<.10

DATE	NITROGEN, AMMONIA DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS, DISSOLVED (MG/L AS P)	PHOSPHORUS, ORTHO, DISSOLVED (MG/L AS P)	PHOSPHATE, ORTHO, DISSOLVED (MG/L AS PO4)	SEDIMENT, SUSPENDED (MG/L)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
OCT 21...	.030	.80	.020	.010	.010	.03	2	.10	100
FEB 16...	.030	.40	.010	.010	<.010	--	2	.03	100
MAY 10...	<.010	.40	.010	<.010	<.010	--	2	.21	100
JUL 27...	.020	.50	.040	.010	<.010	--	0	.00	100

04001000 WASHINGTON CREEK AT WINDIGO, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DATE	TIME	ALUMINUM, DISSOLVED (UG/L AS AL)	ARSENIC DISSOLVED (UG/L AS AS)	BARIUM, DISSOLVED (UG/L AS BA)	BERYLLIUM, DISSOLVED (UG/L AS BE)	CADMIUM DISSOLVED (UG/L AS CD)	CHROMIUM, DISSOLVED (UG/L AS CR)	COBALT, DISSOLVED (UG/L AS CO)	COPPER, DISSOLVED (UG/L AS CU)	IRON, DISSOLVED (UG/L AS FE)	LEAD, DISSOLVED (UG/L AS PB)
OCT 21...	1515	60	1	31	<1	<1	--	<3	5	280	3
MAY 10...	1430	<10	<1	13	<1	<1	3	<3	2	130	13

DATE	LITHIUM DISSOLVED (UG/L AS LI)	MANGANESE, DISSOLVED (UG/L AS MN)	MERCURY DISSOLVED (UG/L AS HG)	MOLYBDENUM, DISSOLVED (UG/L AS MO)	NICKEL, DISSOLVED (UG/L AS NI)	SELENIUM, DISSOLVED (UG/L AS SE)	SILVER, DISSOLVED (UG/L AS AG)	STRONTIUM, DISSOLVED (UG/L AS SR)	VANADIUM, DISSOLVED (UG/L AS V)	ZINC, DISSOLVED (UG/L AS ZN)
OCT 21...	<4	9	<.1	<10	<1	<1	<1	22	<6.0	7
MAY 10...	<4	5	<.1	<10	3	<1	<1	17	<6.0	<3

DATE	TIME	GROSS ALPHA, DISSOLVED (UG/L AS U-NAT)	GROSS ALPHA, SUSP. TOTAL (UG/L AS U-NAT)	GROSS BETA, DISSOLVED (PCI/L AS CS-137)	GROSS BETA, DISSOLVED (PCI/L AS SR/YT-90)	GROSS BETA, SUSP. TOTAL (PCI/L AS SR/YT-90)	RADIUM 226, DISSOLVED, RADON METHOD (PCI/L)	URANIUM DISSOLVED, EXTRACTION (UG/L)
OCT 21...	1515	<2.2	<.5	1.3	1.3	<.7	.03	.05

04001000 WASHINGTON CREEK AT WINDIGO, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	10.5	9.0	5.0	3.5	.0	.0	.0	.0	.0	.0	.0	.0
2	9.5	9.0	5.5	4.0	.0	.0	.0	.0	.0	.0	.0	.0
3	10.0	9.0	5.5	5.0	1.0	.0	.0	.0	.0	.0	.0	.0
4	9.5	8.0	4.5	2.0	1.0	.5	.0	.0	.0	.0	.0	.0
5	9.5	8.5	2.0	1.5	1.0	.5	.0	.0	.0	.0	.0	.0
6	9.5	8.5	1.5	1.0	1.0	.0	.0	.0	.0	.0	.0	.0
7	8.5	8.5	1.5	1.0	.0	.0	.0	.0	.0	.0	.0	.0
8	8.5	8.5	2.0	1.5	.0	.0	.0	.0	.0	.0	.0	.0
9	8.5	8.5	2.0	1.5	.0	.0	.0	.0	.0	.0	.0	.0
10	8.5	8.5	2.0	1.5	.0	.0	.0	.0	.0	.0	.0	.0
11	9.0	8.5	3.0	2.0	.0	.0	.0	.0	.0	.0	.0	.0
12	9.0	9.0	2.5	.0	.0	.0	.0	.0	.0	.0	.0	.0
13	9.0	9.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
14	9.0	9.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
15	9.0	7.5	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
16	7.5	6.5	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
17	6.5	6.0	.5	.0	.0	.0	.0	.0	.0	.0	.0	.0
18	6.5	6.0	1.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
19	6.5	6.5	1.5	1.0	.0	.0	.0	.0	.0	.0	.0	.0
20	6.5	4.5	3.5	1.0	.0	.0	.0	.0	.0	.0	.0	.0
21	4.5	3.5	3.0	.5	.0	.0	.0	.0	.0	.0	1.0	.0
22	3.5	3.0	.5	.0	.0	.0	.0	.0	.0	.0	.0	.0
23	3.5	3.0	.0	.0	.0	.0	.0	.0	.0	.0	1.0	.0
24	4.0	3.5	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
25	4.5	4.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
26	5.0	4.5	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
27	5.5	5.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
28	6.5	5.5	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
29	6.5	6.5	.0	.0	.0	.0	.0	.0	---	---	.0	.0
30	6.5	5.5	.0	.0	.0	.0	.0	.0	---	---	.0	.0
31	5.5	5.0	---	---	.0	.0	.0	.0	---	---	.0	.0
MONTH	10.5	3.0	5.5	.0	1.0	.0	.0	.0	.0	.0	1.0	.0

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	.0	.0	3.5	2.0	12.5	9.5	16.5	15.0	22.0	18.5	19.5	17.0
2	.0	.0	3.5	2.5	15.0	11.0	17.0	15.0	21.0	18.5	21.5	18.5
3	.0	.0	4.0	3.0	14.0	12.5	16.5	15.0	22.0	19.5	21.0	20.0
4	.5	.0	4.0	3.5	13.5	11.0	15.5	14.5	21.0	19.5	20.5	19.0
5	.5	.0	4.0	3.5	12.5	10.5	14.5	12.5	21.0	18.5	19.0	18.0
6	.5	.0	4.5	4.0	12.5	10.0	15.0	13.0	22.5	19.0	18.5	16.5
7	.5	.0	5.0	4.0	13.0	9.5	17.0	15.0	22.0	18.0	17.0	15.0
8	.5	.0	5.0	4.0	12.0	9.5	19.5	16.5	22.0	19.0	17.5	14.0
9	.5	.0	5.5	4.0	11.5	9.5	---	---	20.0	17.0	17.5	17.0
10	.5	.5	7.0	4.5	13.5	9.5	---	---	18.0	17.0	17.5	16.0
11	1.5	.5	9.0	6.0	17.5	12.0	---	---	18.5	16.0	16.0	14.5
12	1.5	.5	9.0	7.0	18.0	14.5	---	---	19.0	16.5	14.5	13.0
13	1.0	.5	9.0	8.0	19.0	16.0	---	---	18.5	16.5	13.0	11.0
14	.5	.5	8.5	7.5	20.0	17.0	---	---	21.0	17.5	12.5	10.5
15	.5	.5	8.0	6.0	18.5	16.0	---	---	20.5	18.0	11.5	10.0
16	.5	.0	8.0	5.5	16.5	14.5	---	---	20.0	18.0	12.5	11.5
17	.5	.0	9.0	6.0	15.0	14.0	---	---	21.5	19.5	12.5	11.0
18	.5	.0	11.5	7.5	17.0	12.0	---	---	21.5	18.5	13.5	12.5
19	.5	.0	10.5	9.0	18.0	13.0	---	---	21.5	20.5	12.5	11.5
20	1.5	.0	9.0	8.0	19.0	14.0	---	---	20.5	18.0	12.0	11.5
21	1.5	.0	11.0	7.5	18.5	16.0	---	---	19.5	18.5	11.5	10.5
22	2.5	.0	10.0	8.5	18.0	17.0	---	---	19.5	17.0	11.0	10.0
23	2.0	.0	11.0	8.0	19.5	16.0	---	---	19.0	16.5	10.0	9.0
24	2.0	.0	10.0	8.5	20.0	16.5	---	---	18.0	16.5	9.5	8.0
25	1.5	.0	10.0	7.0	19.5	17.0	---	---	20.0	18.0	---	---
26	1.5	.5	11.0	7.5	18.0	17.0	---	---	21.0	18.5	---	---
27	1.5	.5	12.0	7.5	17.0	14.5	---	---	20.5	18.5	---	---
28	2.5	.0	10.5	9.0	17.5	13.5	21.5	18.5	20.5	18.5	---	---
29	3.5	1.0	9.0	8.0	17.0	13.0	22.5	19.0	19.5	18.0	---	---
30	3.5	1.0	8.0	8.0	16.5	15.0	21.0	18.5	20.0	18.0	---	---
31	---	---	11.5	8.0	---	---	20.5	18.5	19.5	17.0	---	---
MONTH	3.5	.0	12.0	2.0	20.0	9.5			22.5	16.0		

04033000 MIDDLE BRANCH ONTONAGON RIVER NEAR PAULDING, MI

LOCATION.--Lat 46°21'25", long 89°04'38", in SE1/4 NE1/4 sec.29, T.46 N., R.38 W., Ontonagon County, Hydrologic Unit 04020102, Ottawa National Forest, on right bank 25 ft downstream from bridge on Forest Service Road 172, 2.4 mi upstream from Bond Falls Reservoir, and 5.7 mi southeast of Paulding.

DRAINAGE AREA.--164 mi^2.

PERIOD OF RECORD.--June 1942 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,485.66 ft National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Prior to Sept. 28, 1942, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period and those for period of plugged or partially plugged intakes, Mar. 13 to Apr. 26, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--41 years, 174 ft^3/s, 14.41 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,050 ft^3/s Apr. 30, 1951, gage height, 10.0 ft, from high-water mark; minimum, 27 ft^3/s Nov. 22, 1946, result of freezeup; minimum gage height, 2.96 ft Nov. 26, 1942, result of freezeup.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 584 ft^3/s Apr 27, gage height, 6.20 ft; minimum, 96 ft^3/s Sept. 2, 3, 4, gage height, 3.75 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	194	225	185	195	145	138	145	388	382	150	125	99
2	181	216	205	190	145	138	145	341	305	149	121	98
3	209	213	228	185	150	138	145	305	274	172	121	97
4	209	222	220	180	150	156	145	284	387	328	140	98
5	194	208	208	175	155	238	150	252	414	360	137	108
6	191	202	190	175	155	307	150	228	355	304	127	151
7	252	196	175	175	160	404	150	209	316	241	121	149
8	275	199	155	170	160	479	155	201	262	211	116	130
9	249	196	150	170	160	494	160	191	236	189	111	119
10	267	190	150	170	160	428	170	184	219	172	132	153
11	289	196	150	170	160	380	175	174	196	161	214	230
12	270	227	155	170	160	340	183	170	182	154	176	189
13	245	230	155	165	160	320	202	169	170	146	137	149
14	228	235	160	165	160	290	265	184	168	137	123	133
15	214	225	160	160	160	270	336	171	184	131	117	127
16	201	210	155	160	160	250	336	160	216	125	113	147
17	193	195	150	160	160	230	292	154	211	121	112	166
18	191	190	150	155	160	215	269	152	181	118	113	147
19	188	218	150	155	160	205	246	149	164	115	113	133
20	302	301	145	150	160	190	240	153	151	114	110	266
21	411	384	145	150	155	180	265	160	143	124	109	322
22	395	377	150	150	150	170	320	187	382	149	111	254
23	344	337	160	150	150	165	380	358	472	138	108	212
24	326	289	198	150	150	160	440	343	373	127	104	186
25	331	250	262	150	145	155	500	289	255	120	103	169
26	321	220	296	150	140	150	545	244	213	114	103	159
27	299	200	246	145	140	150	573	214	186	110	103	155
28	279	175	226	145	136	150	548	205	168	108	103	147
29	270	200	221	145	---	150	492	248	154	107	103	138
30	259	195	210	145	---	145	443	375	147	106	101	136
31	238	---	200	145	---	145	---	427	---	117	100	---
TOTAL	8015	6921	5710	5020	4306	7330	8564	7269	7466	4918	3727	4767
MEAN	259	231	184	162	154	236	285	234	249	159	120	159
MAX	411	384	296	195	160	494	573	427	472	360	214	322
MIN	181	175	145	145	136	138	145	149	143	106	100	97
CFSM	1.58	1.41	1.12	.99	.94	1.44	1.74	1.43	1.52	.97	.73	.97
IN.	1.82	1.57	1.30	1.14	.98	1.66	1.94	1.65	1.69	1.12	.85	1.08

CAL YR 1982 TOTAL 75952 MEAN 208 MAX 1070 MIN 85 CFSM 1.27 IN 17.23
WTR YR 1983 TOTAL 74013 MEAN 203 MAX 573 MIN 97 CFSM 1.24 IN 16.79

04033500 BOND FALLS CANAL NEAR PAULDING, MI

LOCATION.--Lat 46°23'57", long 89°08'47", in SW1/4 NE1/4 sec.11, T.46 N., R.39 W., Ontonagon County, Hydrologic Unit 04020102, on left bank 40 ft upstream from intake to pipeline No. 2, 0.8 mi downstream from Bond Falls Reservoir on Middle Branch Ontonagon River, and 1.6 mi east of Paulding.

PERIOD OF RECORD.--July 1942 to current year.

GAGE.--Water-stage recorder and concrete control. Datum of gage is 1,441.59 ft National Geodetic Vertical Datum of 1929. Prior to Oct. 1, 1968, nonrecording gage at datum 3.00 ft higher.

REMARKS.--Records excellent except those below 10 ft³/s, which are poor. Canal diverts water from Bond Falls Reservoir (station 04034000) to South Branch Ontonagon River; water is used for power production at Victoria Dam near Rockland. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--41 years, 142 ft³/s.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 368 ft³/s May 5, 1960; no flow at times each year since 1961; minimum gage height observed, -0.03 ft Apr. 17, 1963, present datum (two drain holes in weir open and canal gate closed).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00	325	298	137	305	150	172	332	32	321	308	156
2	1.3	325	298	137	305	101	206	331	13	320	307	156
3	3.9	164	272	161	305	40	206	331	14	320	306	155
4	4.1	108	220	222	305	6.6	106	331	13	318	304	155
5	41	59	195	262	305	6.4	9.4	331	13	236	303	155
6	96	7.6	195	261	305	6.8	53	331	13	150	302	154
7	99	9.0	195	237	310	7.2	109	329	13	150	300	151
8	55	50	194	204	310	6.7	63	329	62	150	299	151
9	9.5	167	194	203	312	6.4	9.5	328	247	150	297	151
10	9.5	210	221	223	315	6.1	9.3	327	336	150	303	152
11	9.5	210	233	254	313	6.1	9.0	326	330	91	309	151
12	9.5	262	208	252	312	6.2	8.3	325	329	12	309	130
13	9.8	323	207	274	312	6.4	4.3	324	329	74	309	105
14	9.9	323	207	316	311	6.4	2.5	323	328	226	306	105
15	10	323	207	315	309	6.4	4.9	321	328	329	306	105
16	10	321	206	314	308	6.4	4.8	320	327	328	304	105
17	10	314	225	314	307	6.7	3.0	319	326	326	303	104
18	45	300	250	314	305	6.8	2.9	319	325	325	302	105
19	94	275	249	312	304	6.8	2.8	318	325	324	303	105
20	124	241	249	311	303	6.9	3.6	317	324	322	307	105
21	256	241	249	310	301	6.9	4.1	316	323	323	306	62
22	327	267	249	309	301	6.9	3.8	316	331	323	304	6.9
23	327	300	249	308	282	39	3.5	204	324	322	303	6.4
24	327	300	248	307	248	92	3.2	62	325	320	301	6.4
25	327	300	248	304	216	142	49	50	325	319	299	6.4
26	327	300	248	304	151	199	250	176	324	318	300	6.3
27	327	299	205	304	150	200	333	324	323	316	302	6.2
28	327	298	138	303	150	153	333	323	323	315	302	28
29	327	298	137	302	---	109	333	324	322	313	244	58
30	327	298	137	301	---	121	333	324	321	312	158	58
31	325	---	137	302	---	136	---	198	---	310	157	---
TOTAL	4175.00	7217.6	6768	8377	7960	1607.1	2634.9	9129	7268	8113	9063	2900.6
MEAN	135	241	218	270	284	51.8	87.8	294	242	262	292	96.7
MAX	327	325	298	316	315	200	333	332	336	329	309	156
MIN	.00	7.6	137	137	150	6.1	2.5	50	13	12	157	6.2

CAL YR 1982 TOTAL 61378.51 MEAN 168 MAX 339 MIN .00
WTR YR 1983 TOTAL 75213.20 MEAN 206 MAX 336 MIN .00

04034000 BOND FALLS RESERVOIR NEAR PAULDING, MI

LOCATION.--Lat 46°24'29", long 89°07'42", in SW1/4 sec.1, T.46 N., R.39 W., Ontonagon County, Hydrologic Unit 04020102, at Bond Falls Dam on Middle Branch Ontonagon River, 2.5 mi east of Paulding.

DRAINAGE AREA.--190 mi^2.

PERIOD OF RECORD.--June 1942 to current year. Prior to October 1950, monthend contents only published in WSP 1307.

REVISED RECORDS.--WSP 1911: Drainage area.

GAGE.--Nonrecording gage read once daily. Datum of gage is 1,335.59 ft National Geodetic Vertical Datum of 1929.

REMARKS.--Reservoir is formed by earthfill and concrete dam with one taintor gate; dam completed 1937. Usable capacity, 41,300 acre-ft between gage heights of 120 ft (maximum drawdown) and 141 ft (full pond). Dead storage unknown. Water diverted to South Branch Ontonagon River through Bond Falls Canal (station 04033500); water used for power production at Victoria Dam near Rockland.

COOPERATION.--Gage-height record furnished by Upper Peninsula Power Co. and converted to acre-feet by Geological Survey.

EXTREMES FOR PERIOD OF RECORD (SINCE 1947).--Maximum contents observed, 42,980 acre-ft July 3, 1953, gage height, 141.7 ft, of which 1,680 acre-ft was uncontrolled storage; no usable storage at times; minimum gage height observed, 116.0 ft Mar. 21, 1970.

EXTREMES FOR CURRENT YEAR.--Maximum contents, 41,300 acre-ft Apr. 26, gage height, 141.0 ft; minimum, 14,180 acre-ft Sept. 9, gage height, 128.2 ft.

MONTHEND GAGE HEIGHT AND CONTENTS AT 1030,WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

Date	Elevation (feet)	Contents (acre-feet)	Change in contents (acre-feet)	Change in contents (equivalent in ft^3/s)
Sept. 30	136.2	30240	--	--
Oct. 31	139.8	38440	+8200	+133
Nov. 30	139.7	38210	-230	-3.9
Dec. 31	138.5	35450	-2760	-44.9
CAL YR 1982	--	--	+22790	+31.5
Jan. 31	135.1	27820	-7630	-124
Feb. 28	130.9	19310	-8510	-153
Mar. 31	137.0	32000	+12690	+206
Apr. 30	140.6	40340	+8340	+140
May 31	138.1	34530	-5810	-94.5
June 30	138.0	34300	-230	-3.9
July 31	134.2	25920	-8380	-136
Aug. 31	128.3	14370	-11550	-188
Sept. 30	130.7	18930	+4560	+76.6
WTR YR 1983	--	--	-11310	-15.6

04034500 MIDDLE BRANCH ONTONAGON RIVER NEAR TROUT CREEK, MI

LOCATION.--Lat 46°28'40", long 89°05'25", in SW1/4 sec.8, T.47 N., R.38 W., Ontonagon County, Hydrologic Unit 04020102, on right bank 0.1 mi upstream from State Highway 28, 3.8 mi west of village of Trout Creek, and 7.5 mi downstream from Bond Falls Reservoir.

DRAINAGE AREA.--203 mi^2.

PERIOD OF RECORD.--June 1942 to current year.

REVISED RECORDS.--WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,132.03 ft National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Prior to Nov. 4, 1942, nonrecording gage at same site and datum.

REMARKS.--Records good except those for period of no gage-height record, Jan. 16 to Feb. 15, which are fair. Flow regulated by Bond Falls Reservoir (station 04034000) 7.5 mi upstream. Diversion to South Branch Ontonagon River 8.5 mi upstream by Bond Falls Canal (station 04033500). Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--41 years, 67.1 ft^3/s.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,750 ft^3/s Nov. 7, 1951, gage height, 5.05 ft; minimum, 14 ft^3/s sometime during period Jan. 23 to Feb. 13, 1947, gage height, 1.14 ft, from recorded range in stage, caused by ice jams upstream.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 378 ft^3/s Apr. 26, gage height, 2.90 ft; minimum daily, 45 ft^3/s Dec. 8, May 11, 12, 16-18, Sept. 2-4.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	50	51	52	50	48	48	53	358	58	54	52	51
2	51	51	54	50	48	48	54	243	61	52	51	45
3	52	52	54	50	48	49	55	74	78	69	55	45
4	50	53	52	50	48	54	53	48	97	67	52	45
5	50	53	52	50	48	64	53	48	69	56	51	59
6	53	52	52	50	48	74	55	47	63	53	51	54
7	66	53	48	50	48	94	55	46	60	52	51	48
8	56	53	45	50	48	90	55	46	60	51	51	46
9	54	53	49	50	48	69	57	46	59	51	50	46
10	56	54	52	51	48	61	57	46	58	51	71	60
11	53	55	49	52	48	59	55	45	58	51	63	51
12	53	60	50	49	48	57	54	45	58	51	56	48
13	53	56	51	48	48	57	61	47	57	51	55	46
14	53	55	52	48	48	58	78	46	59	51	54	47
15	51	53	52	48	48	55	69	46	60	51	54	47
16	51	53	50	48	48	54	59	45	64	51	54	50
17	52	52	49	48	48	54	55	45	60	51	54	48
18	53	53	52	48	48	53	53	45	58	51	53	48
19	53	63	51	48	48	53	53	46	57	51	53	47
20	91	94	50	48	49	53	56	47	56	51	53	60
21	67	77	50	48	48	52	64	47	55	55	53	54
22	61	60	50	48	48	51	119	62	217	53	53	53
23	62	57	50	48	48	51	256	73	242	53	52	50
24	65	54	52	48	47	51	313	56	124	52	52	48
25	65	54	70	48	47	51	315	51	56	52	52	48
26	59	52	57	48	47	51	343	48	55	52	52	46
27	56	47	53	48	47	52	370	47	56	52	54	47
28	55	55	50	48	48	51	367	49	54	53	55	47
29	54	52	50	48	---	51	364	60	56	52	53	48
30	53	51	50	48	---	51	360	88	53	52	54	48
31	51	---	50	48	---	51	---	65	---	52	53	---
TOTAL	1749	1678	1598	1514	1341	1767	4011	2105	2218	1644	1667	1480
MEAN	56.4	55.9	51.5	48.8	47.9	57.0	134	67.9	73.9	53.0	53.8	49.3
MAX	91	94	70	52	49	94	370	358	242	69	71	60
MIN	50	47	45	48	47	48	53	45	53	51	50	45

CAL YR 1982 TOTAL 20403 MEAN 55.9 MAX 156 MIN 43
WTR YR 1983 TOTAL 22772 MEAN 62.4 MAX 370 MIN 45

04035500 MIDDLE BRANCH ONTONAGON RIVER NEAR ROCKLAND, MI

LOCATION.--Lat 46°41'57", long 89°09'36", in SE1/4 sec.27, T.50 N., R.39 W., Ontonagon County, Hydrologic Unit 04020102, on left bank 10 ft upstream from bridge on U.S. Highway 45, 700 ft downstream from East Branch, and 2.8 mi southeast of Rockland.

DRAINAGE AREA.--671 mi^2.

PERIOD OF RECORD.--July 1942 to current year.

GAGE.--Water-stage recorder. Datum of gage is 661.1 ft National Geodetic Vertical Datum of 1929. Prior to Apr. 1, 1959, nonrecording gage at site 400 ft upstream at same datum. Apr. 1, 1959 to Oct. 21, 1968, nonrecording gage at present site and datum.

REMARKS.--Records fair. Regulation by Bond Falls Reservoir (station 04034000) 30.0 mi upstream. Diversion to South Branch Ontonagon River by Bond Falls Canal (station 04033500) 31.0 mi upstream. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--41 years, 532 ft^3/s.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 27,000 ft^3/s Aug. 22, 1942, gage height, 21.2 ft, from floodmarks, from rating curve extended above 7,500 ft^3/s on basis of slope-area measurement of peak flow; minimum observed, 142 ft^3/s Dec. 3, 1963, discharge measurement; minimum daily, 145 ft^3/s Dec. 3, 1963.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 5,380 ft^3/s Mar. 7, gage height, 8.64 ft; minimum, 214 ft^3/s July 2, Aug. 9, 10; minimum daily, 217 ft^3/s Aug. 9.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	364	407	540	450	340	370	429	973	1420	268	255	234
2	322	384	870	430	340	390	782	887	914	269	242	228
3	304	372	840	420	340	430	969	590	941	319	263	226
4	334	401	620	410	340	550	789	510	3110	588	267	226
5	304	437	492	400	350	1600	658	465	1430	496	258	358
6	404	438	474	390	350	3070	926	438	860	374	246	454
7	1020	439	420	390	350	4420	824	412	630	322	234	388
8	910	450	354	380	350	4010	877	388	510	294	228	335
9	610	480	340	380	350	2220	1210	380	456	281	217	300
10	1290	513	340	380	350	1330	954	356	420	267	291	433
11	800	710	340	370	350	1190	1050	356	388	261	472	547
12	810	747	340	370	350	1020	1180	348	356	254	434	399
13	750	767	350	370	350	976	1900	348	340	250	343	342
14	570	753	350	370	350	1180	2800	356	316	242	293	304
15	465	673	350	370	350	980	2260	356	334	240	268	275
16	380	649	350	360	350	765	1300	328	555	238	257	292
17	356	603	340	360	350	649	968	322	516	242	251	350
18	348	595	340	350	360	600	928	322	423	240	243	327
19	356	1010	340	350	380	570	877	328	362	237	240	308
20	2460	3940	340	350	404	510	1200	356	333	231	240	756
21	1980	2680	340	350	438	501	1810	380	316	238	234	1070
22	1350	1190	350	340	483	429	2250	720	2580	258	240	1040
23	1210	890	400	340	474	372	2200	2880	1770	257	237	710
24	1580	690	1090	340	429	350	1950	1470	793	243	232	496
25	1700	580	2320	340	396	340	1940	952	511	237	231	384
26	1110	570	2090	340	370	340	2080	680	346	232	232	327
27	811	474	1210	330	370	330	1830	540	320	227	236	299
28	675	460	910	330	370	380	1430	456	292	226	239	281
29	594	460	657	330	---	344	1240	709	278	226	240	269
30	525	450	605	340	---	340	1100	3690	271	228	240	259
31	458	---	470	340	---	372	---	2590	---	244	239	---
TOTAL	25150	23212	19172	11370	10384	30948	40711	23886	22091	8529	8142	12217
MEAN	811	774	618	367	371	998	1357	771	736	275	263	407
MAX	2460	3940	2320	450	483	4420	2800	3690	3110	588	472	1070
MIN	304	372	340	330	340	330	429	322	271	226	217	226

CAL YR 1982 TOTAL 225634 MEAN 618 MAX 7350 MIN 220
WTR YR 1983 TOTAL 235812 MEAN 646 MAX 4420 MIN 217

04036000 WEST BRANCH ONTONAGON RIVER NEAR BERGLAND, MI

LOCATION.--Lat 46°35'15", long 89°32'30", in SW1/4 NE1/4 sec.3, T.48 N., R.42 W., Ontonagon County, Hydrologic Unit 04020102, on right bank 0.4 mi downstream from dam at outlet of Gogebic Lake, and 1.5 mi east of Bergland.

DRAINAGE AREA.--162 mi^2.

PERIOD OF RECORD.--July 1942 to current year.

REVISED RECORDS.--WSP 1911: Drainage area.

GAGE.--Water- stage recorder. Datum of gage is 1,290.81 ft National Geodetic Vertical Datum of 1929. Prior to Nov. 5, 1942, nonrecording gage 0.4 mi upstream at different datum.

REMARKS.--Records good except those below 10 ft^3/s, which are fair. Flow regulated by Gogebic Lake, usable capacity, 35,200 acre-ft. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--41 years, 176 ft^3/s, 14.75 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,400 ft^3/s Apr. 26, 1960, gage height, 5.98 ft; minimum daily, 0.70 ft^3/s Sept. 26 to Oct. 19, 1963.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 764 ft^3/s June 22, gage height, 4.46 ft; minimum daily, 1.8 ft^3/s Sept. 15-18.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	173	371	390	171	220	229	286	544	505	158	8.5	3.3
2	181	356	381	120	220	226	279	530	499	82	8.4	3.2
3	176	359	396	230	224	222	274	321	495	48	9.0	2.8
4	171	337	379	218	234	224	274	147	623	51	9.2	2.7
5	162	340	368	210	246	229	269	152	679	44	8.9	2.7
6	166	353	381	210	241	241	267	84	708	45	8.8	2.5
7	202	322	344	182	241	264	268	63	685	162	8.7	2.5
8	188	303	345	170	238	297	267	66	657	207	7.7	2.4
9	190	249	331	206	231	318	262	46	616	163	7.0	2.4
10	220	216	315	246	226	333	270	33	462	152	7.2	2.7
11	330	223	302	180	209	348	269	32	423	151	7.4	2.2
12	395	218	285	178	192	354	268	31	405	222	6.0	2.1
13	382	303	271	198	186	360	273	31	196	237	5.8	2.1
14	380	337	260	188	151	366	287	30	119	174	5.7	2.0
15	330	346	251	171	142	366	307	29	118	150	5.7	1.8
16	315	326	242	169	150	366	312	29	120	143	5.5	1.8
17	319	315	231	202	146	366	313	29	115	141	5.4	1.8
18	306	313	225	234	143	366	312	28	115	110	5.4	1.8
19	241	257	224	241	140	366	311	28	115	36	5.1	66
20	254	326	220	266	137	360	310	28	115	14	4.8	164
21	350	411	211	269	161	354	315	28	114	14	4.8	208
22	396	460	203	243	180	351	329	29	522	13	4.8	207
23	396	510	197	222	161	344	354	29	689	13	4.6	208
24	410	530	194	198	162	337	382	28	666	12	4.5	211
25	398	498	208	177	211	332	417	27	442	12	4.0	198
26	408	479	220	173	246	325	451	153	246	11	3.7	193
27	418	460	217	202	241	318	508	197	204	11	3.6	189
28	414	440	234	220	231	313	538	102	174	9.7	3.6	192
29	433	427	248	217	---	305	557	54	169	9.6	3.5	184
30	416	408	241	220	---	299	560	59	170	9.2	3.3	179
31	386	---	236	213	---	294	---	194	---	9.0	3.3	---
TOTAL	9506	10793	8550	6344	5510	9773	10089	3181	11166	2613.5	183.9	2241.8
MEAN	307	360	276	205	197	315	336	103	372	84.3	5.93	74.7
MAX	433	530	396	269	246	366	560	544	708	237	9.2	211
MIN	162	216	194	120	137	222	262	27	114	9.0	3.3	1.8

CAL YR 1982 TOTAL 79047.2 MEAN 217 MAX 972 MIN 4.8 CFSM 1.34 IN 18.15
WTR YR 1983 TOTAL 79951.2 MEAN 219 MAX 708 MIN 1.8 CFSM 1.35 IN 18.36

04037500 CISCO BRANCH ONTONAGON RIVER AT CISCO LAKE OUTLET, MI

LOCATION.--Lat 46°15'12", long 89°27'05", in NE1/4 sec.32, T.45 N., R.41 W., Gogebic County, Hydrologic Unit 04020102, on left bank 80 ft downstream from Cisco Lake Dam, 2.5 mi upstream from Langford Creek, 5.0 mi upstream from U.S. Highway 2, and 13 mi west of Watersmeet.

DRAINAGE AREA.--50.7 mi^2.

PERIOD OF RECORD.--October 1944 to current year.

REVISED RECORDS.--WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,672.69 ft National Geodetic Vertical Datum of 1929. Prior to Oct. 1, 1968, nonrecording gage at same site and at datum 4.00 ft higher.

REMARKS.--Records good except those below 10.0 ft^3/s, which are poor. Flow completely regulated by Cisco Lake, usable capacity, 15,600 acre-ft. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--39 years, 47.5 ft^3/s, 12.72 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 288 ft^3/s May 1-4, 1951, gage height, 6.10 ft, present datum; minimum daily, 0.09 ft^3/s June 4-23, 1977.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 190 ft^3/s July 5, 6, gage height, 5.60 ft; minimum daily, 0.25 ft^3/s May 16, 20.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	50	112	102	95	65	50	49	65	.89	30	.40	14
2	52	108	102	93	65	50	49	73	.87	31	.39	14
3	52	108	102	90	66	50	49	72	1.4	40	.65	14
4	106	106	101	88	66	51	49	38	5.8	47	.67	14
5	138	103	100	87	65	68	49	2.4	9.7	98	.62	15
6	119	102	102	71	64	81	48	1.5	22	188	.61	25
7	142	100	101	75	57	84	49	1.2	51	182	.44	68
8	162	96	100	87	49	85	49	.93	93	174	.36	95
9	159	95	99	86	49	88	49	.64	108	168	26	92
10	157	95	97	77	49	89	51	.38	110	162	111	97
11	152	93	96	62	48	89	51	.35	110	72	128	98
12	147	95	94	53	49	89	58	.29	110	3.6	97	96
13	142	112	76	60	46	89	71	.39	85	2.5	72	93
14	136	101	59	67	30	88	79	.37	28	1.6	50	60
15	129	113	60	67	30	87	81	.31	1.9	1.6	49	14
16	126	110	59	67	31	87	81	.25	1.3	1.4	41	15
17	126	108	60	67	31	86	80	.27	1.0	1.3	29	23
18	121	100	59	66	31	86	79	.26	.95	1.0	29	30
19	116	104	61	66	31	85	79	.27	1.0	1.0	17	30
20	122	110	61	65	31	85	78	.25	16	.90	2.8	80
21	128	113	61	56	32	84	77	.28	29	1.0	2.3	124
22	127	109	61	41	32	83	77	.36	117	1.1	1.8	123
23	124	114	61	32	32	80	77	.55	177	.93	1.5	122
24	123	105	61	33	33	79	77	.58	173	.85	1.3	119
25	120	112	66	33	33	78	62	.68	168	.74	.93	116
26	120	109	68	33	34	76	42	.59	162	.46	.77	51
27	122	111	86	34	34	76	54	.55	103	.40	.47	25
28	88	109	102	34	43	62	61	.44	30	.40	.34	11
29	96	107	102	44	---	49	65	.64	30	.38	8.4	1.6
30	117	105	100	53	---	49	70	1.0	29	.36	15	1.5
31	115	---	98	59	---	49	---	1.2	---	.42	14	---
TOTAL	3734	3165	2557	1941	1226	2332	1890	264.93	1775.81	1213.94	702.75	1681.1
MEAN	120	106	82.5	62.6	43.8	75.2	63.0	8.55	59.2	39.2	22.7	56.0
MAX	162	114	102	95	66	89	81	73	177	188	128	124
MIN	50	93	59	32	30	49	42	.25	.87	.36	.34	1.5

CAL YR 1982 TOTAL 24215.97 MEAN 66.3 MAX 201 MIN .29 CFSM 1.31 IN 17.77
WTR YR 1983 TOTAL 22483.53 MEAN 61.6 MAX 188 MIN .25 CFSM 1.21 IN 16.50

04040000 ONTONAGON RIVER NEAR ROCKLAND, MI
(National stream-quality accounting network station)

LOCATION.--Lat 46°43'15", long 89°12'25", in NE1/4 sec.20, T.50 N., R.39 W., Ontonagon County, Hydrologic Unit 04020102, on left bank 50 ft downstream from bridge on Victoria Road, 1.8 mi southwest of Rockland, and 2.4 mi downstream from confluence of Middle and West Branches.

DRAINAGE AREA.--1,340 mi^2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--June 1942 to current year.

REVISED RECORDS.--WSP 1387: 1943, 1946-47. WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 638.72 ft National Geodetic Vertical Datum of 1929. Prior to Nov. 23, 1943, nonrecording gage and Nov. 23, 1943 to Oct. 17, 1967, water-stage recorder at site 50 ft upstream at same datum.

REMARKS.--Water-discharge records good except those for the winter period, which are fair. Flow regulated by Victoria powerplant on West Branch 5 mi upstream; Bond Falls Reservoir (station 04034000) 34 mi upstream; Gogebic and Cisco Lakes, combined usable capacity, 50,800 acre-ft, in headwaters.

AVERAGE DISCHARGE.--41 years, 1,425 ft^3/s, 14.44 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 42,000 ft^3/s Aug. 22, 1942, gage height, 28.6 ft, from floodmark, from rating curve extended above 14,000 ft^3/s on basis of slope-area measurement of peak flow; minimum daily, 192 ft^3/s July 28, 29, 1963.

EXTREMES FOR CURRENT YEAR.--Peak discharges above basae of 9,000 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Nov. 20	2300	10,600	13.30	June 22	2200	*15,600	*15.60
Mar. 8	0100	11,400	13.69				

Minimum daily discharge, 375 ft^3/s Aug. 31.

DISCHARGE. IN CUBIC FEET PER SECOND. WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1000	1890	2050	1320	1050	1250	1300	2660	4360	1110	747	530
2	1270	1770	2390	1300	1150	1300	1500	2590	2910	1190	698	500
3	1260	1730	2890	1300	1100	1400	1910	2260	2270	1040	608	440
4	1270	1500	2600	1300	1050	1810	2150	1620	6430	1630	789	518
5	1220	1470	2160	1300	1200	3110	1890	1400	4830	2170	964	761
6	901	1850	1820	1280	1150	5770	2070	1430	3570	1460	644	852
7	1530	1580	1450	1250	1200	9280	1990	1200	2280	1100	554	728
8	1880	1550	1190	1250	1200	9920	2120	1120	1730	1120	420	824
9	1610	1810	1000	1200	1200	7240	2460	1080	1750	1200	536	810
10	3630	1700	1080	1200	1200	5010	2520	985	1880	1080	775	638
11	2850	1960	1060	1200	1200	3680	2330	1020	1660	1040	929	1160
12	2550	2350	1100	1200	1200	3140	2200	901	1670	985	1180	1250
13	2260	2340	1120	1050	1200	2980	3210	915	1450	887	1080	1030
14	1960	2270	1180	1200	1100	3090	5360	1020	1190	845	566	596
15	1580	2170	1200	1150	1100	2810	4900	1010	1140	722	506	722
16	1310	2070	1200	1100	1150	2380	3340	992	1510	803	775	740
17	1270	2080	1000	1100	1150	2100	2470	908	1510	957	845	915
18	1280	1980	1200	1200	1100	1890	2150	964	1180	894	810	845
19	1310	2470	1200	1000	1150	1740	2060	894	1160	887	915	722
20	4570	7930	1200	1100	1300	1590	2520	908	1080	722	644	1320
21	4850	8820	1150	1200	1250	1500	3710	950	978	734	686	1990
22	4080	5390	1150	1200	1400	1350	5310	1910	9750	734	490	2770
23	3750	4250	1150	1250	1400	1150	5870	6170	10600	747	747	2150
24	3870	3020	1290	1200	1300	1150	5730	3830	5860	734	662	1690
25	4910	2270	2890	1200	1200	1150	5790	2220	3630	831	680	1290
26	4490	2220	4400	1200	1250	1150	6060	1570	1700	716	740	1090
27	3610	2210	3200	1000	1250	1150	6240	1410	1430	608	530	838
28	2890	1990	2200	1100	1250	1150	5050	1330	1430	789	480	915
29	2500	1820	1800	1200	---	1150	4060	1790	1270	1090	747	775
30	2430	2120	1500	1200	---	1150	3380	6380	1080	852	656	740
31	2120	---	1350	1200	---	1150	---	6370	---	728	375	---
TOTAL	76011	78580	52170	36950	33450	84690	101650	59807	83288	30405	21778	30149
MEAN	2452	2619	1683	1192	1195	2732	3388	1929	2776	981	703	1005
MAX	4910	8820	4400	1320	1400	9920	6240	6380	10600	2170	1180	2770
MIN	901	1470	1000	1000	1050	1150	1300	894	978	608	375	440

CAL YR 1982 TOTAL 663512 MEAN 1818 MAX 17500 MIN 509 CFSM 1.36 IN 18.42
WTR YR 1983 TOTAL 688928 MEAN 1887 MAX 10600 MIN 375 CFSM 1.41 IN 19.13

04040000 ONTONAGON RIVER NEAR ROCKLAND, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1967, 1972 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: October 1974 to September 1981.
WATER TEMPERATURES: October 1974 to September 1981.

INSTRUMENTATION.--Water-quality monitor October 1975 to September 1977.

REMARKS.--Quarterly samples were collected during the year as a cross-section sample at upstream side of bridge on Victoria Road. Complete ice cover during winter period. Daily record for water years 1975, 1978-81 is from once-daily observer samples.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum recorded (water years 1975-80), 192 micromhos Mar. 26, 1977, May 28, 1978; minimum (water years 1975-76, 1979-80), 45 micromhos Dec. 2, 1975.
WATER TEMPERATURES: Maximum (water years 1975-80), 28.0°C July 19, 1977; minimum, 0.0°C on many days during winter periods.

WATER QUALITY DATA, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (STAND-ARD UNITS)	TEMPER-ATURE (DEG C)	TUR-BID-ITY (NTU)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)
OCT 19...	1630	1270	102	7.5	7.5	30	11.4	97	--	460
JAN 05...	1500	1450	106	7.7	.0	22	13.9	98	110	K14
APR 12...	1600	2050	93	7.5	3.0	65	13.3	101	21	250
JUL 14...	1015	725	111	7.8	24.0	15	7.9	97	22	K1600

DATE	HARD-NESS (MG/L AS CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	PERCENT SODIUM	SODIUM AD-SORP-TION RATIO	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	ALKA-LINITY LAB (MG/L AS CACO3)	CARBON DIOXIDE DIS-SOLVED (MG/L AS CO2)
OCT 19...	50	14	3.6	2.5	0	.2	.6	46	2.8
JAN 05...	51	14	3.9	2.2	8	.1	.7	47	1.8
APR 12...	46	13	3.3	2.3	0	.2	1.0	41	2.5
JUL 14...	61	17	4.5	2.8	9	.2	.8	57	1.7

DATE	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER AC-FT)	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)
OCT 19...	12	2.3	<.1	8.2	83	72	.11	285	<.10
JAN 05...	11	2.1	<.1	10	86	73	.12	337	.14
APR 12...	13	2.7	<.1	9.4	92	71	.13	509	.11
JUL 14...	6.3	2.0	<.1	7.9	91	76	.12	178	<.10

04040000 ONTONAGON RIVER NEAR ROCKLAND, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DATE	NITROGEN, AMMONIA DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS, DISSOLVED (MG/L AS P)	PHOSPHORUS, ORTHO, DISSOLVED (MG/L AS P)	PHOSPHATE, ORTHO, DISSOLVED (MG/L AS PO4)	SEDIMENT, SUSPENDED (MG/L)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
OCT 19...	.040	.60	.070	.030	.040	.12	41	141	100
JAN 05...	.020	.30	.020	.020	<.010	--	29	114	76
APR 12...	.020	.60	.070	.050	.040	.12	104	576	91
JUL 14...	.020	.30	.040	.020	<.010	--	9	18	99

DATE	TIME	ALUMINUM, DISSOLVED (UG/L AS AL)	ARSENIC DISSOLVED (UG/L AS AS)	BARIUM, DISSOLVED (UG/L AS BA)	BERYLLIUM, DISSOLVED (UG/L AS BE)	CADMIUM DISSOLVED (UG/L AS CD)	CHROMIUM, DISSOLVED (UG/L AS CR)	COBALT, DISSOLVED (UG/L AS CO)	COPPER, DISSOLVED (UG/L AS CU)	IRON, DISSOLVED (UG/L AS FE)	LEAD, DISSOLVED (UG/L AS PB)
OCT 19...	1630	240	1	44	<1	<1	<1	<3	3	310	1
JAN 05...	1500	30	1	36	<1	<1	<1	<3	5	280	4
APR 12...	1600	490	1	63	<1	<1	3	<3	3	560	5
JUL 14...	1015	30	1	100	<1	<1	<1	<3	2	190	2

DATE	LITHIUM DISSOLVED (UG/L AS LI)	MANGANESE, DISSOLVED (UG/L AS MN)	MERCURY DISSOLVED (UG/L AS HG)	MOLYBDENUM, DISSOLVED (UG/L AS MO)	NICKEL, DISSOLVED (UG/L AS NI)	SELENIUM, DISSOLVED (UG/L AS SE)	SILVER, DISSOLVED (UG/L AS AG)	STRONTIUM, DISSOLVED (UG/L AS SR)	VANADIUM, DISSOLVED (UG/L AS V)	ZINC, DISSOLVED (UG/L AS ZN)
OCT 19...	<4	16	<.1	<10	1	<1	<1	33	<6.0	7
JAN 05...	<4	13	<.1	<10	1	<1	<1	33	<6.0	<4
APR 12...	<4	24	<.1	<10	2	<1	<1	31	<6.0	11
JUL 14...	<4	3	<.1	<10	1	<1	<1	42	<6.0	11

04040500 STURGEON RIVER NEAR SIDNAW, MI

LOCATION.--Lat 46°35'03", long 88°34'33", in NE1/4 SE1/4 sec.5, T.48 N., R.34 W., Baraga County, Hydrologic Unit 04020104, on right bank 30 ft downstream from highway bridge, 3.0 mi downstream from Rock River, 3.5 mi northwest of Covington, 6.5 mi upstream from Perch River, 8.5 mi northeast of Sidnaw, and at mile 71.

DRAINAGE AREA.--171 mi^2.

PERIOD OF RECORD.--October 1912 to September 1915, April 1943 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1507: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,214.40 ft National Geodetic Vertical Datum of 1929. October 1912 to September 1915, nonrecording gage at site 200 ft upstream at different datum. Apr. 2, 1943 to Oct. 1, 1946, nonrecording gage at present site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--43 years, 217 ft^3/s, 17.23 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,630 ft^3/s Apr. 24, 1960, gage height, 11.63 ft; minimum, 2.7 ft^3/s Sept. 13, 1976, gage height, 3.17 ft.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,830 ft^3/s Apr. 28, gage height, 7.82 ft; minimum, 12 ft^3/s Sept. 2, 3, 4, gage height, 3.51 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	270	369	258	245	105	105	164	1020	1350	90	23	14
2	246	336	297	227	105	105	176	835	962	85	24	14
3	321	321	342	224	105	105	185	725	800	87	29	13
4	315	315	336	202	110	110	178	650	1390	180	32	14
5	276	306	303	188	110	180	171	575	1430	214	32	26
6	315	303	288	176	110	450	192	500	1140	178	29	100
7	405	288	237	165	110	815	188	424	815	136	25	140
8	414	303	230	155	110	860	185	381	630	111	22	159
9	396	288	225	150	110	780	209	342	485	96	19	136
10	620	276	220	145	110	635	214	303	396	84	27	130
11	605	330	215	140	110	640	222	270	348	73	87	178
12	645	393	210	135	110	580	217	240	297	67	101	183
13	600	400	205	130	110	550	318	232	255	60	80	153
14	535	410	200	130	110	510	600	261	224	56	59	119
15	448	380	188	125	110	428	645	264	258	49	46	98
16	387	350	166	120	110	381	535	235	342	44	37	95
17	348	320	155	120	110	351	460	209	357	53	33	98
18	330	300	151	120	105	330	393	192	318	53	28	101
19	306	369	153	115	105	288	366	176	264	52	25	96
20	620	670	153	115	105	270	381	171	222	48	22	209
21	795	815	151	115	105	240	460	176	195	41	21	300
22	780	755	148	115	105	230	635	405	270	38	20	339
23	720	640	148	110	105	220	765	1270	300	35	19	336
24	690	480	157	110	105	210	825	1440	237	32	16	291
25	695	432	300	110	105	205	948	1200	190	30	16	235
26	670	387	420	110	105	200	1240	840	178	26	17	195
27	625	348	390	110	105	197	1630	640	153	25	18	164
28	585	300	363	110	105	188	1790	490	134	24	18	144
29	560	270	339	105	---	180	1580	670	113	23	19	128
30	500	255	290	105	---	173	1280	1360	98	22	18	111
31	420	---	260	105	---	164	---	1530	---	22	16	---
TOTAL	15442	11709	7498	4332	3010	10680	17152	18026	14151	2134	978	4319
MEAN	498	390	242	140	108	345	572	581	472	68.8	31.5	144
MAX	795	815	420	245	110	860	1790	1530	1430	214	101	339
MIN	246	255	148	105	105	105	164	171	98	22	16	13
CFSM	2.91	2.28	1.42	.82	.63	2.02	3.35	3.40	2.76	.40	.18	.84
IN.	3.36	2.55	1.63	.94	.65	2.32	3.73	3.92	3.08	.46	.21	.94

CAL YR 1982 TOTAL 112196 MEAN 307 MAX 2680 MIN 13 CFSM 1.80 IN 24.41
WTR YR 1983 TOTAL 109431 MEAN 300 MAX 1790 MIN 13 CFSM 1.75 IN 23.81

04041500 STURGEON RIVER NEAR ALSTON, MI

LOCATION.--Lat 46°43'35", long 88°39'43", in SE1/4 sec.15, T.50 N., R.35 W., Baraga County, Hydrologic Unit 04020104, on right bank in powerhouse of Upper Peninsula Power Co. at Prickett Dam, 4.0 mi upstream from Clear Creek, 5.0 mi southeast of Alston, and at mile 45.

DRAINAGE AREA.--346 mi^2.

PERIOD OF RECORD.--February 1932 to June 1941, October 1942 to current year. Monthly discharge only for some periods, published in WSP 1307.

GAGE.--Water-stage recorder. Datum of gage is 710.3 ft mean tide at New York City datum (levels by Corps of Engineers). Prior to Jan. 5, 1948, nonrecording gage and Jan. 5, 1948 to Sept. 30, 1963, water-stage recorder at same site at datum 40.00 ft lower.

REMARKS.--Records good. Flow regulated by powerplant at station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--49 years, (water years 1933-40, 1943-83), 423 ft^3/s,16.60 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 7,360 ft^3/s Apr. 24, 1960, gage height, 13.09 ft,present datum; minimum daily, 1 ft^3/s Aug. 14-19, 1960.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,540 ft^3/s June 2, gage height, 7.44 ft; minimum, 14 ft^3/s Mar. 24, 26, Apr. 3, 4, gage height, 2.71 ft; minimum daily, 18 ft^3/s July 2, 3, 31.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	402	600	400	606	265	263	405	1490	1530	211	169	269
2	408	600	394	413	265	309	405	1240	1660	18	167	196
3	403	600	416	327	261	310	315	1200	1410	18	144	164
4	415	600	584	314	263	400	301	938	1970	214	169	149
5	407	400	584	303	265	408	259	847	1970	213	168	173
6	408	400	589	303	265	425	307	850	1810	211	168	216
7	892	600	596	302	265	1560	308	849	1160	214	167	252
8	745	600	402	303	265	1890	311	685	1180	216	167	286
9	607	600	319	304	263	1750	311	593	722	216	168	306
10	924	400	303	302	263	1390	396	403	609	216	167	334
11	860	400	306	306	199	1060	432	398	611	216	267	346
12	946	400	309	305	262	714	603	400	609	166	267	362
13	982	900	312	304	259	953	599	395	613	166	267	370
14	742	600	311	304	203	998	603	398	617	166	264	342
15	606	600	310	305	261	889	1090	401	620	168	218	306
16	607	600	309	306	262	882	1300	403	619	168	168	286
17	607	600	308	308	259	813	814	401	1160	167	183	276
18	600	600	307	309	262	611	608	398	1290	168	216	272
19	610	600	308	264	260	611	599	396	1000	170	215	272
20	1000	1000	309	265	261	608	606	361	686	170	217	322
21	1530	1300	306	264	261	609	605	349	596	167	205	428
22	1100	900	307	264	262	609	982	351	598	170	261	510
23	1100	900	311	261	262	608	1330	563	583	169	310	556
24	1060	849	309	262	260	406	1320	2330	406	170	343	547
25	1060	674	395	264	262	354	1360	1600	418	169	402	497
26	918	594	592	264	261	403	1630	1360	591	170	392	440
27	870	585	590	264	265	408	1970	1140	265	167	478	390
28	764	587	528	263	263	403	2150	1110	382	169	468	351
29	689	395	600	263	---	394	2140	1120	380	168	402	320
30	839	399	595	263	---	403	1850	1130	209	168	342	297
31	840	---	602	265	---	407	---	1250	---	18	346	---
TOTAL	23941	18883	12811	9350	7224	21848	25909	25349	26274	5177	7885	9835
MEAN	772	629	413	302	258	705	864	818	876	167	254	328
MAX	1530	1300	602	606	265	1890	2150	2330	1970	216	478	556
MIN	402	395	303	261	199	263	259	349	209	18	144	149
CFSM	2.23	1.82	1.19	.87	.75	2.04	2.50	2.36	2.53	.48	.73	.95
IN.	2.57	2.03	1.38	1.01	.78	2.35	2.79	2.73	2.82	.56	.85	1.06

CAL YR 1982 TOTAL 188209 MEAN 516 MAX 3360 MIN 16 CFSM 1.49 IN 20.24
WTR YR 1983 TOTAL 194486 MEAN 533 MAX 2330 MIN 18 CFSM 1.54 IN 20.91

04043004 STURGEON RIVER NEAR CHASSELL, MI
(National stream-quality accounting network station)

LOCATION.--Lat 46°58'28", long 88°31'21", in NE1/4 SW1/4 sec.20, T.53 N., R.33 W., Houghton County, Hydrologic Unit 04020104, 2.2 mi upstream from bridge on county road, 3.5 mi south of Chassell, and at mile 5.2.

DRAINAGE AREA.--723 mi^2.

PERIOD OF RECORD.--Water years 1978 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: March 1978 to September 1981.
WATER TEMPERATURES: March 1978 to September 1981.

REMARKS.--Quarterly samples were collected during the year as a cross-section sample at bridge 2.2 mi downstream. Diurnal fluctuation and occasional slight regulation by powerplant at Prickett Dam at mile 45. Complete ice cover during winter period.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum daily, 267 micromhos Feb. 19, 1980; minimum daily, 46 micromhos Apr. 26, 27, 29, 1979.
WATER TEMPERATURES: Maximum daily, 26.0°C July 26, 1978, July 13, 1979; minimum daily, 0.0°C on many days during winter periods.

WATER QUALITY DATA, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (STAND-ARD UNITS)	TEMPER-ATURE (DEG C)	TUR-BID-ITY (NTU)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)
OCT										
20...	1230	1160	94	7.5	7.0	3.6	10.4	88	--	130
JAN										
06...	1145	923	96	7.3	.0	3.6	12.8	91	K4	94
APR										
13...	1130	1660	95	7.5	3.0	7.0	12.2	94	K4	67
JUL										
13...	1115	548	115	7.7	23.5	5.5	7.1	85	56	230

DATE	HARD-NESS (MG/L AS CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	PERCENT SODIUM	SODIUM AD-SORP-TION RATIO	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	ALKA-LINITY LAB (MG/L AS CACO3)	CARBON DIOXIDE DIS-SOLVED (MG/L AS CO2)
OCT									
20...	47	13	3.4	2.5	10	.2	.8	42	2.6
JAN									
06...	--	--	--	--	--	--	.6	44	4.3
APR									
13...	44	12	3.3	2.2	0	.2	.8	43	2.6
JUL									
13...	61	17	4.4	2.7	9	.2	.9	57	2.2

DATE	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER AC-FT)	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)
OCT									
20...	13	2.2	<.1	7.8	79	69	.11	247	<.10
JAN									
06...	11	2.0	<.1	--	80	--	.11	199	.16
APR									
13...	6.3	1.9	<.1	9.0	23	62	.03	103	.12
JUL									
13...	6.7	1.6	<.1	7.8	95	76	.13	141	<.10

04043004 STURGEON RIVER NEAR CHASSELL, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DATE	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N)	NITRO-GEN,AM-MONIA + ORGANIC TOTAL (MG/L AS N)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS, DIS-SOLVED (MG/L AS P)	PHOS-PHORUS, ORTHO, DIS-SOLVED (MG/L AS P)	PHOS-PHATE, ORTHO, DIS-SOLVED (MG/L AS PO4)	SEDI-MENT, SUS-PENDED (MG/L)	SEDI-MENT, DIS-CHARGE, SUS-PENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
OCT 20...	.030	.40	.040	.050	.030	.09	19	60	100
JAN 06...	.030	.50	.020	.030	.010	.03	16	40	73
APR 13...	<.010	.30	.040	<.010	<.010	--	54	242	73
JUL 13...	.030	.40	.040	.020	<.010	--	6	8.9	99

DATE	TIME	ALUM-INUM, DIS-SOLVED (UG/L AS AL)	ARSENIC DIS-SOLVED (UG/L AS AS)	BARIUM, DIS-SOLVED (UG/L AS BA)	BERYL-LIUM, DIS-SOLVED (UG/L AS BE)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COBALT, DIS-SOLVED (UG/L AS CO)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, DIS-SOLVED (UG/L AS PB)
OCT 20...	1230	90	2	51	<1	<1	<1	<3	3	340	3
JAN 06...	1145	10	1	--	--	--	<1	--	3	--	4
APR 13...	1130	70	1	57	<1	<1	4	<3	2	300	6
JUL 13...	1115	40	1	100	<1	<1	<1	<3	2	430	7

DATE	LITHIUM DIS-SOLVED (UG/L AS LI)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY DIS-SOLVED (UG/L AS HG)	MOLYB-DENUM, DIS-SOLVED (UG/L AS MO)	NICKEL, DIS-SOLVED (UG/L AS NI)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	SILVER, DIS-SOLVED (UG/L AS AG)	STRON-TIUM, DIS-SOLVED (UG/L AS SR)	VANA-DIUM, DIS-SOLVED (UG/L AS V)	ZINC, DIS-SOLVED (UG/L AS ZN)
OCT 20...	<4	15	<.1	<10	2	<1	<1	32	<6.0	5
JAN 06...	--	--	<.1	--	1	--	<1	--	--	--
APR 13...	<4	19	<.1	<10	2	<1	<1	32	<6.0	<3
JUL 13...	<4	20	<.1	<10	1	<1	<1	45	<6.0	14

04043050 TRAP ROCK RIVER NEAR LAKE LINDEN, MI

LOCATION.--Lat 47°13'43", long 88°23'07", in SE1/4 SE1/4 sec.20, T.56 N., R.32 W., Houghton County, Hydrologic Unit 04020103, on right bank 20 ft upstream from bridge on county highway, 2.0 mi northeast of Lake Linden, and 3.0 mi upstream from mouth.

DRAINAGE AREA.--28.0 mi^2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1966 to current year.

GAGE.--Water-stage recorder. Datum of gage is 621.7 ft National Geodetic Vertical Datum of 1929.

REMARKS.--Water-discharge records good. From April 1973 to December 1977, flow includes about 0.1 ft^3/s mine pumpage. Small diversions for sprinkler irrigation.

AVERAGE DISCHARGE.--17 years, 45.4 ft^3/s, 22.02 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,590 ft^3/s May 10, 1979, gage height, 10.72 ft; minimum daily, 6.8 ft^3/s Oct. 3, 1976; minimum gage height, 3.85 ft June 23, 1977.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 522 ft^3/s Apr. 27, gage height, 7.29 ft, only peak above base of 380 ft^3/s; minimum, 12 ft^3/s Aug. 9, 10, 17, 18, 19, 26, 27, 28, 29, gage height, 3.91 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	24	47	41	33	24	31	36	133	116	25	16	20
2	21	42	55	31	24	29	55	119	80	23	15	17
3	35	40	69	30	24	28	62	108	66	26	16	16
4	29	58	58	30	24	29	54	93	127	38	16	15
5	25	62	49	29	24	35	48	80	122	30	15	60
6	60	58	42	29	24	57	61	70	80	25	14	63
7	108	51	37	29	24	125	59	62	61	22	14	36
8	92	59	34	28	24	192	61	55	52	20	13	26
9	61	59	33	29	24	159	82	49	51	19	13	22
10	153	61	31	29	24	114	103	46	45	18	14	25
11	134	128	30	29	24	105	114	41	39	17	18	31
12	113	129	29	29	24	94	92	38	34	16	15	23
13	88	105	29	29	24	82	197	39	32	16	14	20
14	67	83	29	28	25	77	286	39	29	16	14	18
15	53	70	29	27	26	67	169	35	31	15	14	17
16	44	62	29	27	25	60	109	33	52	15	13	22
17	38	57	29	27	25	56	91	31	39	15	13	23
18	35	54	29	26	25	52	78	29	31	16	13	22
19	34	64	29	26	25	48	75	29	28	15	29	21
20	78	174	29	26	26	45	91	32	26	14	20	25
21	89	176	28	26	27	43	125	34	25	14	16	27
22	75	99	27	26	27	40	160	53	27	14	16	23
23	76	77	29	26	27	39	204	182	25	14	15	21
24	86	62	36	26	26	38	243	104	24	14	14	19
25	113	56	58	25	26	37	280	71	23	14	14	18
26	107	48	60	25	25	36	364	55	32	14	13	17
27	84	42	48	25	25	35	416	46	31	13	12	16
28	78	39	40	25	30	34	293	39	26	13	13	16
29	78	38	35	25	---	32	221	118	23	13	22	16
30	71	36	35	25	---	32	172	303	23	13	51	18
31	56	---	35	25	---	31	---	210	---	17	27	---
TOTAL	2205	2136	1171	850	702	1882	4401	2376	1400	554	522	713
MEAN	71.1	71.2	37.8	27.4	25.1	60.7	147	76.6	46.7	17.9	16.8	23.8
MAX	153	176	69	33	30	192	416	303	127	38	51	63
MIN	21	36	27	25	24	28	36	29	23	13	12	15
CFSM	2.54	2.54	1.35	.98	.90	2.17	5.25	2.74	1.67	.64	.60	.85
IN.	2.93	2.84	1.56	1.13	.93	2.50	5.85	3.16	1.86	.74	.69	.95

CAL YR 1982 TOTAL 21339 MEAN 58.5 MAX 998 MIN 14 CFSM 2.09 IN 28.35
WTR YR 1983 TOTAL 18912 MEAN 51.8 MAX 416 MIN 12 CFSM 1.85 IN 25.13

04043050 TRAP ROCK RIVER NEAR LAKE LINDEN, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: October 1971 to current year.

INSTRUMENTATION.--Temperature recorder since Oct. 1, 1971.

REMARKS.--Complete ice cover during winter period.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum, 24.5° July 30, 1975, July 14, 15, 1983; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum, 24.5°C July 14, 15; minimum, 0.0°C on many days during winter period.

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	12.0	10.0	5.5	4.5	2.5	2.0	.5	.5	.5	.5	1.5	.5
2	11.5	9.5	6.0	5.5	3.0	2.5	.5	.5	.5	.5	1.5	.5
3	11.5	10.0	5.5	5.0	3.0	3.0	.5	.5	.5	.5	2.0	1.5
4	10.5	8.5	5.0	3.5	3.0	2.5	.5	.5	.5	.5	2.0	2.0
5	11.0	9.0	4.0	2.5	2.5	2.0	.5	.5	.5	.5	2.0	2.0
6	10.5	9.0	2.5	2.0	2.0	.5	.5	.5	.5	.5	2.0	1.5
7	9.5	9.5	2.5	1.5	.5	.5	.5	.5	.5	.5	1.5	.5
8	9.5	8.5	3.5	2.5	.5	.5	.5	.5	.5	.5	.5	.0
9	8.5	8.0	3.5	3.0	.5	.5	.5	.5	.5	.5	.0	.0
10	9.5	8.5	3.0	3.0	.5	.5	1.0	.5	.5	.5	.0	.0
11	9.5	9.0	3.5	3.0	.5	.5	1.0	.5	.5	.5	.0	.0
12	9.5	9.0	3.5	.5	.5	.5	.5	.5	.5	.5	.0	.0
13	9.5	9.0	.5	.5	.5	.5	.5	.5	1.5	.5	.5	.0
14	9.5	8.5	1.0	.5	.5	.5	.5	.5	1.5	1.5	.5	.0
15	9.0	7.0	1.0	.5	.5	.5	.5	.5	1.5	1.5	1.0	.0
16	7.0	6.0	2.0	1.0	.5	.5	.5	.5	1.5	1.5	1.5	.5
17	6.0	5.0	2.0	1.5	.5	.5	.5	.5	2.0	1.5	1.5	1.0
18	7.0	5.0	1.5	1.0	1.0	.5	.5	.5	1.5	.5	1.5	.5
19	7.0	6.5	2.5	1.5	1.5	1.0	.5	.5	2.5	1.5	.5	.0
20	6.5	2.0	3.5	2.5	1.5	1.0	.5	.5	2.0	2.0	.5	.0
21	3.5	2.0	3.5	1.5	1.0	1.0	.5	.5	2.0	1.5	.5	.0
22	4.0	3.0	2.0	1.5	1.5	1.0	.5	.5	1.5	1.0	.5	.0
23	3.5	2.5	2.0	1.0	2.0	1.5	.5	.5	1.5	1.0	.5	.0
24	4.0	3.0	1.0	.5	2.0	2.0	.5	.5	1.0	.0	.0	.0
25	5.0	4.0	1.0	.5	2.0	.5	.5	.5	1.0	.0	.5	.0
26	5.0	4.0	.5	.5	.5	.5	.5	.5	.0	.0	2.0	.0
27	5.5	4.5	.5	.5	.5	.5	.5	.5	3.0	.0	2.0	1.5
28	6.5	5.5	1.0	.5	.5	.5	.5	.5	3.0	1.5	3.5	1.0
29	7.0	6.5	1.0	.5	.5	.5	.5	.5	---	---	3.0	.5
30	6.5	5.0	2.0	1.0	.5	.5	.5	.5	---	---	2.5	1.5
31	5.0	4.0	---	---	.5	.5	.5	.5	---	---	4.0	2.5
MONTH	12.0	2.0	6.0	.5	3.0	.5	1.0	.5	3.0	.0	4.0	.0

04043050 TRAP ROCK RIVER NEAR LAKE LINDEN, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	4.5	2.5	7.5	4.5	13.5	9.5	19.0	15.5	21.5	17.0	19.0	15.5
2	3.0	2.0	8.5	6.0	15.0	11.5	20.0	15.5	22.0	17.5	20.5	16.5
3	3.0	2.0	9.0	6.0	14.5	12.0	19.0	16.0	21.5	19.5	20.0	17.0
4	2.5	1.5	9.0	7.5	13.0	11.0	17.5	16.0	19.5	17.0	19.5	17.5
5	4.5	2.0	9.0	6.0	13.0	10.0	17.0	13.0	21.0	16.5	17.5	16.5
6	3.0	2.0	9.5	6.5	14.0	10.5	18.0	12.5	22.5	18.5	18.0	16.5
7	3.0	1.5	9.5	7.5	14.0	10.5	21.0	14.5	22.5	17.5	17.0	15.0
8	4.5	1.5	9.5	6.5	12.5	10.5	22.0	17.5	22.5	19.5	18.0	14.5
9	3.0	1.0	10.0	6.0	14.5	10.0	20.5	16.5	20.5	16.5	18.0	17.0
10	2.5	1.0	11.0	6.5	15.0	10.5	20.5	15.5	18.5	16.0	17.5	16.0
11	2.0	1.0	13.0	8.0	17.5	12.5	22.5	16.5	19.0	15.0	15.5	14.0
12	4.0	1.0	13.0	9.5	18.5	14.5	22.0	17.0	19.5	14.5	15.0	13.5
13	3.0	1.0	11.5	10.5	19.0	15.0	22.5	17.5	19.0	15.5	14.0	11.0
14	1.5	1.0	11.0	9.0	19.5	15.5	24.5	19.0	21.0	17.0	13.5	10.5
15	1.5	1.0	11.0	7.5	19.0	16.0	24.5	20.0	20.5	17.0	12.5	9.5
16	1.5	1.0	10.0	7.0	17.0	14.0	24.0	19.5	21.0	18.0	12.0	11.0
17	3.0	1.0	11.5	6.5	16.0	13.5	24.0	20.0	21.0	18.0	12.5	10.5
18	3.5	1.0	13.0	8.0	17.0	12.5	22.5	18.5	20.5	17.0	13.5	12.0
19	4.5	1.0	12.0	9.0	17.5	12.5	23.0	18.5	21.0	18.5	13.0	11.5
20	6.0	2.0	11.0	8.0	18.5	13.0	22.0	18.5	20.5	17.0	11.5	11.0
21	5.5	2.5	13.5	9.5	18.0	15.0	22.5	18.5	19.5	17.0	11.5	10.0
22	6.0	2.5	12.5	10.5	20.5	15.5	21.5	17.0	19.5	16.5	10.5	9.5
23	6.0	2.0	12.5	9.5	21.0	16.5	22.5	18.5	18.5	15.5	10.5	8.5
24	6.0	2.0	12.5	10.0	20.0	15.5	21.0	17.5	18.0	15.5	11.0	7.5
25	7.0	2.0	11.5	8.0	19.0	15.5	21.0	16.0	18.5	15.0	12.0	8.5
26	7.0	2.5	12.0	8.0	18.0	16.5	21.0	16.5	20.0	17.5	12.5	9.0
27	6.5	4.0	13.0	8.5	17.0	14.5	21.0	17.0	20.0	17.0	12.0	9.5
28	6.0	3.5	11.5	9.5	18.0	13.0	22.0	18.0	20.0	17.0	13.0	10.0
29	6.5	5.0	10.0	8.5	17.0	13.0	23.5	19.0	19.0	16.5	13.5	12.0
30	6.5	4.5	8.5	8.5	18.5	14.5	22.5	18.5	19.5	17.0	13.0	12.5
31	---	---	11.0	8.5	---	---	20.5	18.0	19.0	16.5	---	---
MONTH	7.0	1.0	13.5	4.5	21.0	9.5	24.5	12.5	22.5	14.5	20.5	7.5

04044400 CARP RIVER NEAR NEGAUNEE, MI

LOCATION.--Lat 46°31'29", long 87°34'25", in SE1/4 sec.29, T.48 N., R.26 W., Marquette County, Hyrologic Unit 04020105, on right bank 30 ft downstream from bridge on U.S. Highway 41, and 2.0 mi northeast of Negaunee.

DRAINAGE AREA.--51.4 mi^2.

PERIOD OF RECORD.--July 1961 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,319.90 ft National Geodetic Vertical Datum of 1929 (Michigan Department of Highway and Transportation benchmark). Prior to Aug. 24, 1961, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Flow regulated by Deer Lake storage reservoir (capacity, 22,500 acre-ft) 5 mi upstream. The city of Ishpeming diverted an average of 2.3 ft^3/s into basin as waste effluent (station 04058200). Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--22 years, 61.4 ft^3/s.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 545 ft^3/s May 30, 1983, gage height, 5.46 ft; minimum, 3.7 ft^3/s July 29, 1965; minimum gage height, 1.94 ft Aug. 1, 1962; minimum daily discharge, 3.9 ft^3/s July 29, 30, 1965.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 545 ft^3/s May 30, gage height, 5.46 ft; minimum, 22 ft^3/s Feb. 3, gage height, 2.45 ft, result of freezeup.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	51	52	50	60	42	54	57	113	154	75	71	66
2	49	51	53	58	39	54	61	104	120	74	69	70
3	50	51	57	56	35	54	60	98	113	76	71	69
4	48	52	55	55	40	55	59	93	141	89	72	69
5	47	52	51	54	45	59	58	85	135	85	70	73
6	51	52	48	54	50	64	59	82	109	77	68	78
7	55	51	44	54	52	80	59	83	101	74	67	76
8	53	53	44	55	53	91	58	79	96	72	67	70
9	51	52	44	55	53	96	60	73	94	72	66	65
10	72	51	45	54	53	78	61	72	92	71	70	67
11	83	57	45	53	54	104	62	72	89	70	84	69
12	70	82	46	51	54	83	60	72	86	70	79	66
13	61	93	46	50	54	72	65	71	84	69	71	64
14	57	65	46	49	54	69	94	71	82	69	67	62
15	55	62	46	48	54	66	116	68	82	68	66	61
16	55	55	46	48	55	64	104	65	90	69	66	66
17	53	52	46	48	55	62	88	64	90	70	66	66
18	52	52	46	48	55	62	77	63	85	70	66	61
19	51	61	46	49	55	55	72	65	82	70	66	57
20	65	78	48	50	55	51	71	66	80	70	66	84
21	95	69	52	52	55	80	78	66	79	70	65	91
22	78	59	61	53	55	68	90	72	79	70	65	71
23	70	55	67	54	55	64	99	124	79	70	66	62
24	73	54	71	52	55	61	110	105	77	70	66	59
25	77	57	79	50	56	62	126	79	77	69	66	57
26	67	52	87	49	55	58	166	71	78	69	65	56
27	60	40	77	48	54	58	228	66	77	69	64	56
28	58	56	69	47	55	58	212	65	77	68	59	56
29	57	53	68	46	---	59	162	144	75	68	61	55
30	58	52	66	45	---	56	143	430	75	68	65	56
31	54	---	62	44	---	56	---	214	---	70	64	---
TOTAL	1876	1721	1711	1589	1447	2053	2815	2997	2778	2221	2094	1978
MEAN	60.5	57.4	55.2	51.3	51.7	66.2	93.8	96.7	92.6	71.6	67.5	65.9
MAX	95	93	87	60	56	104	228	430	154	89	84	91
MIN	47	40	44	44	35	51	57	63	75	68	59	55

CAL YR 1982 TOTAL 22549 MEAN 61.8 MAX 241 MIN 34
WTR YR 1983 TOTAL 25280 MEAN 69.3 MAX 430 MIN 35

04045500 TAHQUAMENON RIVER NEAR TAHQUAMENON PARADISE, MI
(National stream-quality accounting network station)

LOCATION.--Lat 46°34'30", long 85°16'10", in NE1/4 sec.11, T.48 N., R.8 W., Luce County, Hydrologic Unit 04020202, on left bank 0.7 mi upstream from Tahquamenon (Big) Falls, 11.5 mi west of Tahquamenon Paradise, and 19 mi northeast of Newberry.

DRAINAGE AREA.--790 mi^2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--August 1953 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 697 ft from river-profile map (nearest ft).

REMARKS.--Water-discharge records good.

AVERAGE DISCHARGE.--30 years, 938 ft^3/s, 16.12 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 6,990 ft^3/s May 10, 1960, gage height, 10.26 ft; minimum, 157 ft^3/s July 26, 1955; minimum gage height, 2.86 ft July 7, 1963.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 3,050 ft^3/s Apr. 17, gage height, 7.39 ft; minimum, 178 ft^3/s July 27, 28, 29, gage height, 2.90 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1260	1230	1370	2030	516	642	887	1090	1550	264	249	317
2	1190	1170	1310	1970	518	674	914	1080	1670	274	284	306
3	1100	1140	1290	1880	523	694	974	1210	1720	293	289	299
4	1030	1160	1280	1770	519	714	1090	1280	1700	295	288	284
5	936	1200	1310	1640	513	735	1240	1330	1650	300	292	282
6	856	1240	1520	1520	507	844	1400	1350	1590	324	279	286
7	808	1250	1700	1410	504	1180	1540	1330	1480	326	277	289
8	818	1250	1790	1310	501	1600	1630	1360	1390	318	247	300
9	857	1260	1710	1210	494	2070	1740	1400	1270	323	238	290
10	909	1260	1700	1130	488	2310	1870	1410	1170	331	233	291
11	1040	1290	1560	1060	483	2640	1980	1370	1070	320	240	304
12	1120	1450	1480	1000	465	2650	2070	1300	941	291	278	312
13	1170	1720	1440	961	453	2610	2150	1220	805	290	307	313
14	1200	1910	1370	919	443	2550	2420	1140	682	276	301	304
15	1180	2070	1290	896	444	2430	2750	1090	589	262	295	300
16	1180	2120	1200	864	451	2330	2960	1070	512	257	288	296
17	1170	2070	1120	812	462	2200	3040	1020	451	254	280	308
18	1160	2020	1030	754	474	2100	2990	959	411	256	286	322
19	1100	1960	949	708	484	1940	2910	867	386	247	356	339
20	1200	2020	885	666	501	1600	2750	817	362	236	508	398
21	1450	2110	840	622	542	1710	2570	798	335	224	571	528
22	1620	2180	805	584	591	1650	2370	746	322	222	559	629
23	1730	2190	782	556	623	1550	2170	715	286	212	527	716
24	1800	2160	860	540	635	1430	1980	721	284	207	486	763
25	1780	2070	1100	533	634	1310	1820	725	283	206	438	736
26	1720	1940	1360	532	623	1210	1660	750	272	206	396	700
27	1640	1790	1520	529	611	1140	1490	767	271	204	371	653
28	1550	1680	1740	523	615	1070	1370	748	276	198	355	615
29	1480	1580	1900	517	---	1010	1260	826	275	202	342	576
30	1370	1470	2000	513	---	970	1160	1210	270	209	326	539
31	1300	---	2040	513	---	919	---	1400	---	219	318	---
TOTAL	38724	49960	42251	30472	14617	48482	57155	33099	24273	8046	10504	12595
MEAN	1249	1665	1363	983	522	1564	1905	1068	809	260	339	420
MAX	1800	2190	2040	2030	635	2650	3040	1410	1720	331	571	763
MIN	808	1140	782	513	443	642	887	715	270	198	233	282
CFSM	1.58	2.11	1.73	1.24	.66	1.98	2.41	1.35	1.02	.33	.43	.53
IN.	1.82	2.35	1.99	1.43	.69	2.28	2.69	1.56	1.14	.38	.49	.59

CAL YR 1982 TOTAL 400691 MEAN 1098 MAX 5100 MIN 226 CFSM 1.39 IN 18.87
WTR YR 1983 TOTAL 370178 MEAN 1014 MAX 3040 MIN 198 CFSM 1.28 IN 17.43

04045500 TAHQUAMENON RIVER NEAR TAHQUAMENON PARADISE, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1967, 1973 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: October 1974 to September 1981.
WATER TEMPERATURES: October 1974 to September 1981.

INSTRUMENTATION.--Water-quality monitor October 1975 to September 1981.

REMARKS.--Quarterly samples were collected during the year as a cross-section sample at cableway 40 ft downstream from gage or by wading 300 ft to 1000 ft downstream. Complete ice cover during the winter period at gage. Beginning 300 ft downstream, no significant ice cover.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum recorded (water years 1976-81), 238 micromhos Jan. 24, 1977; minimum (water years 1976, 1978-81), 34 micromhos Apr. 17, 18, 1976.
WATER TEMPERATURES (water years 1976-81): Maximum, 26.5°C May 21, 1977; minimum, 0.0°C on many days during winter periods.

WATER QUALITY DATA, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DATE	TIME	STREAM-FLOW, INSTANTANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (STAND-ARD UNITS)	TEMPER-ATURE (DEG C)	TUR-BID-ITY (NTU)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD-NESS (MG/L AS CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)
OCT												
25...	1515	1800	97	7.0	6.0	2.1	8.2	67	24	82	49	14
JAN												
11...	1315	1050	112	7.3	.0	1.6	7.4	52	37	97	51	14
APR												
12...	1440	2070	75	6.3	3.0	1.5	10.9	83	K3	K11	33	9.4
JUL												
12...	1410	273	187	8.0	23.0	3.1	7.6	91	K4	100	103	29

DATE	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	PERCENT SODIUM	SODIUM AD-SORP-TION RATIO	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	ALKA-LINITY LAB (MG/L AS CACO3)	CARBON DIOXIDE DIS-SOLVED (MG/L AS CO2)	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)
OCT												
25...	3.5	1.2	5	.1	.3	37	7.2	12	2.4	<.1	6.2	94
JAN												
11...	3.8	1.3	5	.1	.4	37	3.6	13	1.7	<.1	7.1	84
APR												
12...	2.4	1.3	8	.1	.5	25	7.7	8.5	2.0	<.1	4.0	51
JUL												
12...	7.4	2.6	5	.1	.7	88	1.7	15	1.8	.1	5.3	137

DATE	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER AC-FT)	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS, DIS-SOLVED (MG/L AS P)	PHOS-PHORUS, ORTHO, DIS-SOLVED (MG/L AS P)	SEDI-MENT, SUS-PENDED (MG/L)	SEDI-MENT, DIS-CHARGE, SUS-PENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
OCT												
25...	63	.13	457	<.10	.020	.90	.090	<.010	<.010	5	24	96
JAN												
11...	64	.11	238	.14	.050	.70	.350	.010	<.010	2	5.7	100
APR												
12...	43	.07	285	<.10	<.010	.30	.010	<.010	<.010	2	11	100
JUL												
12...	115	.19	101	<.10	<.010	.50	.040	.010	<.010	2	1.5	100

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04045500 TAHQUAMENON RIVER NEAR TAHQUAMENON PARADISE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DATE	TIME	ALUMINUM, DISSOLVED (UG/L AS AL)	ARSENIC DISSOLVED (UG/L AS AS)	BARIUM, DISSOLVED (UG/L AS BA)	BERYLLIUM, DISSOLVED (UG/L AS BE)	CADMIUM DISSOLVED (UG/L AS CD)	CHROMIUM, DISSOLVED (UG/L AS CR)	COBALT, DISSOLVED (UG/L AS CO)	COPPER, DISSOLVED (UG/L AS CU)	IRON, DISSOLVED (UG/L AS FE)	LEAD, DISSOLVED (UG/L AS PB)
OCT											
25...	1515	130	1	26	<1	<1	<1	<3	3	530	<1
JAN											
11...	1315	120	1	24	<1	<1	31	<3	2	310	2
APR											
12...	1440	80	1	35	<1	<1	<1	<3	1	200	6
JUL											
12...	1410	20	1	81	<1	1	<1	5	<1	170	10

DATE	LITHIUM DISSOLVED (UG/L AS LI)	MANGANESE, DISSOLVED (UG/L AS MN)	MERCURY DISSOLVED (UG/L AS HG)	MOLYBDENUM, DISSOLVED (UG/L AS MO)	NICKEL, DISSOLVED (UG/L AS NI)	SELENIUM, DISSOLVED (UG/L AS SE)	SILVER, DISSOLVED (UG/L AS AG)	STRONTIUM, DISSOLVED (UG/L AS SR)	VANADIUM, DISSOLVED (UG/L AS V)	ZINC, DISSOLVED (UG/L AS ZN)
OCT										
25...	<4	13	.1	<10	40	<1	<1	34	<6.0	<4
JAN										
11...	<4	18	.3	<10	1	--	<1	33	<6.0	14
APR										
12...	<4	7	<.1	<10	1	<1	<1	23	<6.0	42
JUL										
12...	<4	5	1.1	<10	1	<1	<1	70	<6.0	6

04045580 ST. MARYS RIVER ABOVE SAULT STE. MARIE, MI

(National stream-quality accounting network and radiochemical station)

LOCATION.--Lat 46°29'29", long 84°25'17", in NW1/4 sec.10, T.47 N., R.1 W., Chippewa County, Hydrologic Unit 04020300, at Sault Ste. Marie municipal raw-water intake at Big Point, 2.6 mi west of the International Bridge, at Sault Ste. Marie.

DRAINAGE AREA.--80,900 mi^2, approximately.

PERIOD OF RECORD.--Water years 1970 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: March 1974 to September 1981.
WATER TEMPERATURES: March 1974 to September 1981.

REMARKS.--Quarterly samples were collected during the year at the raw-water tap in Sault Ste. Marie municipal water plant at Big Point. Intake is 1,500 ft out at a depth of 30 ft, 10 ft above bottom of channel.

COOPERATION.--Discharge figures are monthly means furnished by U.S. Army Corps of Engineers, Sault Ste. Marie.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum daily, 113 micromhos Oct. 26, 1980; minimum daily, 76 micromhos Apr. 24, 1975.
WATER TEMPERATURES: Maximum daily, 24.0°C July 25, 1979; minimum daily, 0.0°C Mar. 14, 15, 1974, Feb. 1, 1979.

WATER QUALITY DATA, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DATE	TIME	DIS-CHARGE, IN CUBIC FEET PER SECOND	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (STAND-ARD UNITS)	TEMPER-ATURE (DEG C)	TUR-BID-ITY (NTU)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD-NESS (MG/L AS CACO3)
OCT 26...	0930	89500	98	6.8	7.5	1.0	11.9	100	K1	K1	44
JAN 12...	0930	81000	92	7.3	.5	<1.0	14.1	101	<1	K1	44
APR 13...	0900	85600	98	7.4	.5	<1.0	13.6	96	<1	<1	43
JUL 13...	0930	103000	96	7.8	19.5	.50	9.8	109	K3	16	47

DATE	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	PERCENT SODIUM	SODIUM AD-SORP-TION RATIO	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	ALKA-LINITY LAB (MG/L AS CACO3)	CARBON DIOXIDE DIS-SOLVED (MG/L AS CO2)	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)
OCT 26...	13	2.7	1.3	6	.1	.3	42	13	<5.0	.7	<.1
JAN 12...	13	2.8	1.4	6	.1	.4	43	4.2	3.7	2.0	<.1
APR 13...	13	2.6	1.6	7	.1	.6	42	3.2	4.3	1.4	<.1
JUL 13...	14	3.0	2.0	8	.1	.6	43	1.3	3.5	1.5	.1

DATE	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER AC-FT)	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N)	NITRO-GEN,AM-MONIA + ORGANIC TOTAL (MG/L AS N)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS, DIS-SOLVED (MG/L AS P)	PHOS-PHORUS, ORTHO, DIS-SOLVED (MG/L AS P)
OCT 26...	2.3	52	--	.07	12600	.26	.030	.20	<.010	<.010	<.010
JAN 12...	2.4	52	52	.07	11400	.31	.030	.40	.020	<.010	<.010
APR 13...	2.5	40	51	.05	9240	.27	<.010	<.10	<.010	<.010	<.010
JUL 13...	2.3	63	53	.09	17500	.22	<.010	.30	.030	<.010	<.010

04045580 ST. MARYS RIVER ABOVE SAULT STE.MARIE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DATE	TIME	ALUMINUM, DIS-SOLVED (UG/L AS AL)	ARSENIC DIS-SOLVED (UG/L AS AS)	BARIUM, DIS-SOLVED (UG/L AS BA)	BERYLLIUM, DIS-SOLVED (UG/L AS BE)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHROMIUM, DIS-SOLVED (UG/L AS CR)	COBALT, DIS-SOLVED (UG/L AS CO)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, DIS-SOLVED (UG/L AS PB)
OCT											
26...	0930	20	1	22	<1	<1	<1	<3	4	3	1
JAN											
12...	0930	70	2	22	<1	<1	<1	<3	5	<3	2
APR											
13...	0900	30	1	41	<1	<1	<1	<3	3	10	3
JUL											
13...	0930	<10	1	55	<1	1	<1	5	3	6	8

DATE	LITHIUM DIS-SOLVED (UG/L AS LI)	MANGANESE, DIS-SOLVED (UG/L AS MN)	MERCURY DIS-SOLVED (UG/L AS HG)	MOLYBDENUM, DIS-SOLVED (UG/L AS MO)	NICKEL, DIS-SOLVED (UG/L AS NI)	SELENIUM, DIS-SOLVED (UG/L AS SE)	SILVER, DIS-SOLVED (UG/L AS AG)	STRONTIUM, DIS-SOLVED (UG/L AS SR)	VANADIUM, DIS-SOLVED (UG/L AS V)	ZINC, DIS-SOLVED (UG/L AS ZN)
OCT										
26...	<4	<1	.2	<10	1	<1	<1	22	<6.0	44
JAN										
12...	<4	<1	.2	<10	1	<1	<1	22	<6.0	52
APR										
13...	<4	<1	<.1	<10	1	<1	<1	22	<6.0	82
JUL										
13...	<4	2	.3	<10	1	<1	<1	23	<6.0	66

DATE	TIME	GROSS ALPHA, DIS-SOLVED (UG/L AS U-NAT)	GROSS ALPHA, SUSP. TOTAL (UG/L AS U-NAT)	GROSS BETA, DIS-SOLVED (PCI/L AS CS-137)	GROSS BETA, DIS-SOLVED (PCI/L AS SR/YT-90)	GROSS BETA, SUSP. TOTAL (PCI/L AS SR/YT-90)	RADIUM 226, DIS-SOLVED, RADON METHOD (PCI/L)	URANIUM DIS-SOLVED, EXTRACTION (UG/L)
OCT								
26...	0930	<1.2	<.4	1.6	1.5	<.4	.06	--
APR								
13...	0900	<1.1	<.4	1.7	1.7	<.4	.03	<.01

04056500 MANISTIQUE RIVER NEAR MANISTIQUE, MI

LOCATION.--Lat 46°01'50", long 86°09'40", in SE1/4 sec.15, T.42 N., R.15 W., Schoolcraft County, Hydrologic Unit 04060106, on left bank 1.0 mi downstream from West Branch, 6.0 mi northeast of Manistique, and at mile 19.5.

DRAINAGE AREA.--1,100 mi^2, approximately.

PERIOD OF RECORD.--March 1938 to current year.

REVISED RECORDS.--WSP 1387: 1940-42(M), 1943, 1945. WSP 1627, 1727: 1938, 1939.

GAGE.--Water-stage recorder. Altitude of gage is 608 ft from river-profile map (nearest ft). Prior to July 15, 1939, non-recording gage at site 1,600 ft upstream at different datum.

REMARKS.--Records good except those for the winter period, which are fair. Since July 1948, slight regulation by dam on outlet of Manistique Lake. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--45 years, 1,446 ft^3/s, 17.85 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 16,900 ft^3/s May 11, 1960, gage height, 12.85 ft; minimum, 288 ft^3/s Oct. 4, 1948; minimum gage height, 1.01 ft Aug. 23, 1941.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 5,320 ft^3/s Apr. 18, gage height, 10.16 ft; minimum daily, 410 ft^3/s Sept. 5.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1540	1830	2370	2150	1250	1100	1400	2100	2340	757	508	480
2	1440	1750	2370	2100	1250	1100	1400	2090	2460	745	528	460
3	1390	1710	2390	2000	1200	1200	1500	2170	2490	734	561	440
4	1340	1720	2400	1900	1200	1300	1800	2230	2400	745	562	420
5	1310	1750	2380	1800	1200	1500	1900	2190	2270	762	543	410
6	1290	1780	2540	1700	1200	1820	2100	2110	2120	769	536	430
7	1350	1780	2800	1650	1200	2200	2300	2070	1980	763	521	460
8	1560	1770	2600	1600	1200	2770	2600	2100	1860	728	503	490
9	1730	1750	2400	1550	1200	3310	2800	2140	1750	698	484	508
10	1810	1740	2200	1550	1200	3760	3000	2130	1650	676	472	495
11	1920	1810	2100	1500	1200	3980	3200	2060	1550	659	517	482
12	1970	2030	2000	1500	1150	4080	3500	1970	1450	640	553	485
13	1950	2510	1850	1450	1150	4090	3800	1870	1350	611	568	508
14	1900	2870	1750	1450	1150	4080	4200	1880	1270	596	570	510
15	1820	2950	1650	1450	1150	3960	4600	1980	1200	587	545	494
16	1740	2970	1600	1450	1150	3720	5000	2020	1140	571	525	495
17	1660	2990	1550	1400	1100	3440	5200	2000	1080	560	524	499
18	1620	2940	1500	1400	1100	3210	5300	1900	1040	554	516	535
19	1590	2810	1450	1350	1100	3090	5160	1800	1000	566	503	563
20	1690	2870	1400	1350	1100	2870	4790	1720	971	565	503	606
21	2050	3100	1400	1350	1100	2650	4370	1660	936	548	506	655
22	2380	3310	1350	1350	1150	2500	3950	1610	915	537	507	716
23	2540	3440	1350	1300	1150	2300	3540	1580	910	526	500	801
24	2590	3450	1400	1300	1200	2200	3190	1490	877	515	480	872
25	2550	3310	1500	1300	1200	2100	2930	1530	840	502	470	929
26	2450	3120	1600	1300	1200	2000	2720	1580	813	492	460	928
27	2290	2880	1750	1300	1150	1800	2510	1590	789	483	450	892
28	2160	2660	1850	1300	1150	1700	2330	1560	762	483	450	824
29	2070	2570	2000	1300	---	1600	2210	1560	753	487	460	762
30	1990	2430	2100	1250	---	1500	2150	1770	755	488	480	716
31	1910	---	2150	1250	---	1500	---	2130	---	495	490	---
TOTAL	57600	74600	59750	46600	32750	78430	95450	58590	41721	18842	15795	17865
MEAN	1858	2487	1927	1503	1170	2530	3182	1890	1391	608	510	596
MAX	2590	3450	2800	2150	1250	4090	5300	2230	2490	769	570	929
MIN	1290	1710	1350	1250	1100	1100	1400	1490	753	483	450	410
CFSM	1.69	2.26	1.75	1.37	1.06	2.30	2.89	1.72	1.27	.55	.46	.54
IN.	1.95	2.52	2.02	1.58	1.11	2.65	3.23	1.98	1.41	.64	.53	.60

CAL YR 1982 TOTAL 627117 MEAN 1718 MAX 8470 MIN 560 CFSM 1.56 IN 21.21
WTR YR 1983 TOTAL 597993 MEAN 1638 MAX 5300 MIN 410 CFSM 1.49 IN 20.22

04057004 MANISTIQUE RIVER ABOVE MANISTIQUE, MI
(National stream-quality accounting network station)

LOCATION.--Lat 45°58'18", long 86°14'35", in SE1/4 SE1/4 sec.1, T.41 N., R.16 W., Schoolcraft County, Hydrologic Unit 04060106, at Wyman State Nursery, 0.7 mi downstream from Indian River, 0.8 mi upstream from U.S. Highway 2, and 1.8 mi upstream from mouth.

DRAINAGE AREA.--1,445 mi^2, approximately.

PERIOD OF RECORD.--Water years 1976 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: October 1975 to September 1981.
WATER TEMPERATURES: October 1975 to September 1981.

INSTRUMENTATION.--Water-quality monitor October 1975 to September 1981.

REMARKS.--Bimonthly samples were collected during the year as a cross-section sample at the Wyman State Nursery site or at railroad bridge 1,200 ft downstream. Occasional regulation by dam 0.4 mi downstream. Intermittent ice cover during the winter period. Prior to Oct. 1, 1975, water quality data collected at station 04057005 Manistique River at Manistique, MI, 1.5 mi downstream.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum, 254 micromhos Nov. 24, 1977; minimum (water years 1976, 1979-81), 57 micromhos Apr. 25, 1979.
WATER TEMPERATURES: Maximum (water years 1976-80), 26.5°C July 15, 23, 1979; minimum, 0.0°C on many days during winter periods.

WATER QUALITY DATA, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DATE	TIME	STREAM-FLOW, INSTANTANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (STAND-ARD UNITS)	TEMPER-ATURE (DEG C)	TUR-BID-ITY (NTU)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)
NOV										
09...	1345	1890	152	7.6	4.0	4.0	12.2	94	K4	--
JAN										
19...	1120	1490	164	7.7	.0	2.0	12.1	83	K1	20
MAR										
02...	1030	1260	163	7.5	.5	2.5	11.8	84	<2	K12
MAY										
02...	1235	2900	139	7.7	9.0	3.4	10.6	96	K2	110
JUL										
07...	1335	1100	140	7.8	20.0	2.4	8.0	89	K16	330
SEP										
07...	1310	775	198	7.9	21.0	3.2	7.8	90	45	63

DATE	HARD-NESS (MG/L AS CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	PERCENT SODIUM	SODIUM AD-SORP-TION RATIO	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	ALKA-LINITY LAB (MG/L AS CACO3)	CARBON DIOXIDE DIS-SOLVED (MG/L AS CO2)
NOV									
09...	79	23	5.2	1.4	4	.1	.2	60	2.9
JAN									
19...	83	24	5.5	1.4	4	.1	.6	62	2.4
MAR									
02...	85	25	5.6	1.3	3	.1	.6	70	4.3
MAY									
02...	69	20	4.6	1.1	3	.1	.6	52	2.0
JUL									
07...	95	28	6.0	1.7	4	.1	.6	74	2.3
SEP									
07...	95	28	6.2	1.4	3	.1	.6	79	1.9

DATE	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER AC-FT)	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)
NOV									
09...	22	2.0	<.1	5.9	119	96	.16	607	<.10
JAN									
19...	23	1.6	<.1	7.0	109	101	.15	439	.13
MAR									
02...	21	1.5	.1	7.0	121	104	.16	412	.12
MAY									
02...	22	1.5	<.1	4.2	93	86	.13	728	<.10
JUL									
07...	23	1.6	<.1	5.2	129	111	.18	383	<.10
SEP									
07...	22	1.6	.1	7.1	143	114	.19	299	<.10

04057004 MANISTIQUE RIVER ABOVE MANISTIQUE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DATE	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS, DIS-SOLVED (MG/L AS P)	PHOS-PHORUS, ORTHO, DIS-SOLVED (MG/L AS P)	PHOS-PHATE, ORTHO, DIS-SOLVED (MG/L AS PO4)	SEDI-MENT, SUS-PENDED (MG/L)	SEDI-MENT, DIS-CHARGE, SUS-PENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
NOV									
09...	.030	.40	.040	.020	.030	.09	2	10	100
JAN									
19...	.040	.30	--	.010	<.010	--	3	12	100
MAR									
02...	.060	.40	.010	<.010	<.010	--	2	6.8	100
MAY									
02...	<.010	.30	<.010	<.010	<.010	--	1	7.8	99
JUL									
07...	<.010	.30	.020	.010	<.010	--	0	.00	100
SEP									
07...	<.010	.10	.020	.010	<.010	--	1	2.1	100

DATE	TIME	ALUM-INUM, DIS-SOLVED (UG/L AS AL)	ARSENIC DIS-SOLVED (UG/L AS AS)	BARIUM, DIS-SOLVED (UG/L AS BA)	BERYL-LIUM, DIS-SOLVED (UG/L AS BE)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COBALT, DIS-SOLVED (UG/L AS CO)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, DIS-SOLVED (UG/L AS PB)
NOV											
09...	1345	60	<1	21	1	1	<1	3	2	500	<1
JAN											
19...	1120	<10	1	26	<1	<1	--	<3	3	530	30
MAY											
02...	1235	<10	1	18	<1	<1	<1	<3	2	330	4
JUL											
07...	1335	10	1	38	<1	<1	<1	<3	1	370	1

DATE	LITHIUM DIS-SOLVED (UG/L AS LI)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY DIS-SOLVED (UG/L AS HG)	MOLYB-DENUM, DIS-SOLVED (UG/L AS MO)	NICKEL, DIS-SOLVED (UG/L AS NI)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	SILVER, DIS-SOLVED (UG/L AS AG)	STRON-TIUM, DIS-SOLVED (UG/L AS SR)	VANA-DIUM, DIS-SOLVED (UG/L AS V)	ZINC, DIS-SOLVED (UG/L AS ZN)
NOV										
09...	4	15	<.1	10	<1	<1	1	64	6.0	4
JAN										
19...	<4	27	.3	10	[illegible]	<1	<1	67	<6.0	6
MAY										
02...	<4	18	<.1	<10	3	<1	<1	53	<6.0	6
JUL										
07...	<4	15	.1	<10	1	<1	<1	75	<6.0	5

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04057510 STURGEON RIVER NEAR NAHMA JUNCTION, MI

LOCATION.--Lat 45°56'35", long 86°42'20", in SW1/4 SE1/4 sec.17, T.41 N., R.19 W., Delta County, Hydrologic Unit 04030112, Hiawatha National Forest, on left bank 30 ft upstream from bridge on Forest Service Road 2231, 500 ft downstream from Mormon Creek, 0.1 mi east of Federal Forest Highway 13, and 3.2 mi north of Nahma Junction.

DRAINAGE AREA.--183 mi^2.

PERIOD OF RECORD.--October 1966 to current year.

GAGE.--Water-stage recorder. Datum of gage is 610.99 ft National Geodetic Vertical Datum of 1929.

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--17 years, 209 ft^3/s, 15.51 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,580 ft^3/s Apr. 18, 1971, Apr. 30, 1972, gage height, 9.85 ft; minimim, 35 ft^3/s Sept. 11, 12, 13, 14, 1976, gage height, 3.58 ft.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,510 ft^3/s Apr. 15, gage height, 9.62 ft; minimum, 49 ft^3/s Aug. 28, 29, gage height, 3.72 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	216	232	288	255	145	145	203	288	520	87	67	61
2	196	226	318	240	140	150	238	301	448	84	66	58
3	197	245	336	230	140	160	275	341	419	82	65	58
4	189	237	326	215	140	180	318	306	415	107	67	55
5	177	224	316	205	135	237	333	278	448	109	64	56
6	204	215	295	195	135	330	365	255	401	101	60	69
7	396	203	270	190	130	471	362	303	350	94	57	84
8	509	197	255	185	130	631	380	420	304	88	54	86
9	436	192	240	180	130	818	412	375	277	84	51	80
10	469	198	230	180	125	626	533	332	257	80	58	74
11	493	270	220	180	125	538	624	292	231	78	102	75
12	423	447	210	180	130	486	577	262	208	75	93	70
13	369	592	200	175	130	462	634	260	189	73	79	68
14	330	510	200	170	135	415	970	326	173	70	72	67
15	303	450	195	170	135	385	1440	305	157	67	72	65
16	297	420	190	165	140	360	1130	267	149	65	68	76
17	283	370	190	165	140	347	894	238	143	63	64	85
18	266	342	185	160	140	330	717	216	134	61	62	98
19	250	369	185	160	140	310	588	212	127	60	60	101
20	383	638	180	160	145	295	513	231	120	59	57	149
21	574	763	180	160	145	280	467	218	115	58	56	216
22	528	636	180	155	145	270	432	206	111	57	59	206
23	467	551	175	155	145	260	401	275	106	55	56	197
24	414	476	190	150	145	250	373	301	101	54	53	192
25	366	398	250	150	145	240	352	320	97	52	52	169
26	326	369	400	150	145	230	338	291	94	51	52	150
27	293	352	360	150	145	225	329	252	90	50	51	133
28	293	310	340	150	145	215	317	221	87	53	49	124
29	291	290	320	145	---	211	310	367	84	60	52	116
30	272	278	300	145	---	209	307	673	84	62	66	108
31	251	---	270	145	---	203	---	612	---	67	63	---
TOTAL	10461	11000	7794	5415	3870	10269	15132	9544	6439	2206	1947	3146
MEAN	337	367	251	175	138	331	504	308	215	71.2	62.8	105
MAX	574	763	400	255	145	818	1440	673	520	109	102	216
MIN	177	192	175	145	125	145	203	206	84	50	49	55
CFSM	1.84	2.01	1.37	.96	.75	1.81	2.75	1.68	1.18	.39	.34	.57
IN.	2.13	2.24	1.58	1.10	.79	2.09	3.08	1.94	1.31	.45	.40	.64

CAL YR 1982 TOTAL 89128 MEAN 244 MAX 1280 MIN 70 CFSM 1.33 IN 18.12
WTR YR 1983 TOTAL 87223 MEAN 239 MAX 1440 MIN 49 CFSM 1.31 IN 17.73

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04057800 MIDDLE BRANCH ESCANABA RIVER AT HUMBOLDT, MI

LOCATION.--Lat 46°29'57", long 87°53'11", in SW1/4 sec.1, T.47 N., R.29 W., Marquette County, Hydrologic Unit 04030110, on left bank 15 ft upstream from county highway, 1.5 mi downstream from Halfway Creek, and 0.3 mi north of Humboldt.

DRAINAGE AREA.--46.0 mi^2.

PERIOD OF RECORD.--June 1959 to current year.

REVISED RECORDS.--WSP 1911: Drainage area.

GAGE.--Water-stage recorder. V-notch sharp-crested weir since Oct. 3, 1960. Datum of gage is 1,521,20 ft National Geodetic Vertical Datum of 1929 (Cleveland-Cliffs Iron Co. benchmark). Prior to Sept. 1, 1960, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. From July 1960 to June 1972, some diversion 100 ft upstream by industry for iron ore processing; figures of runoff adjusted. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--24 years, 61.5 ft^3/s, 18.16 in/yr, adjusted for diversion 1960 to 1972.

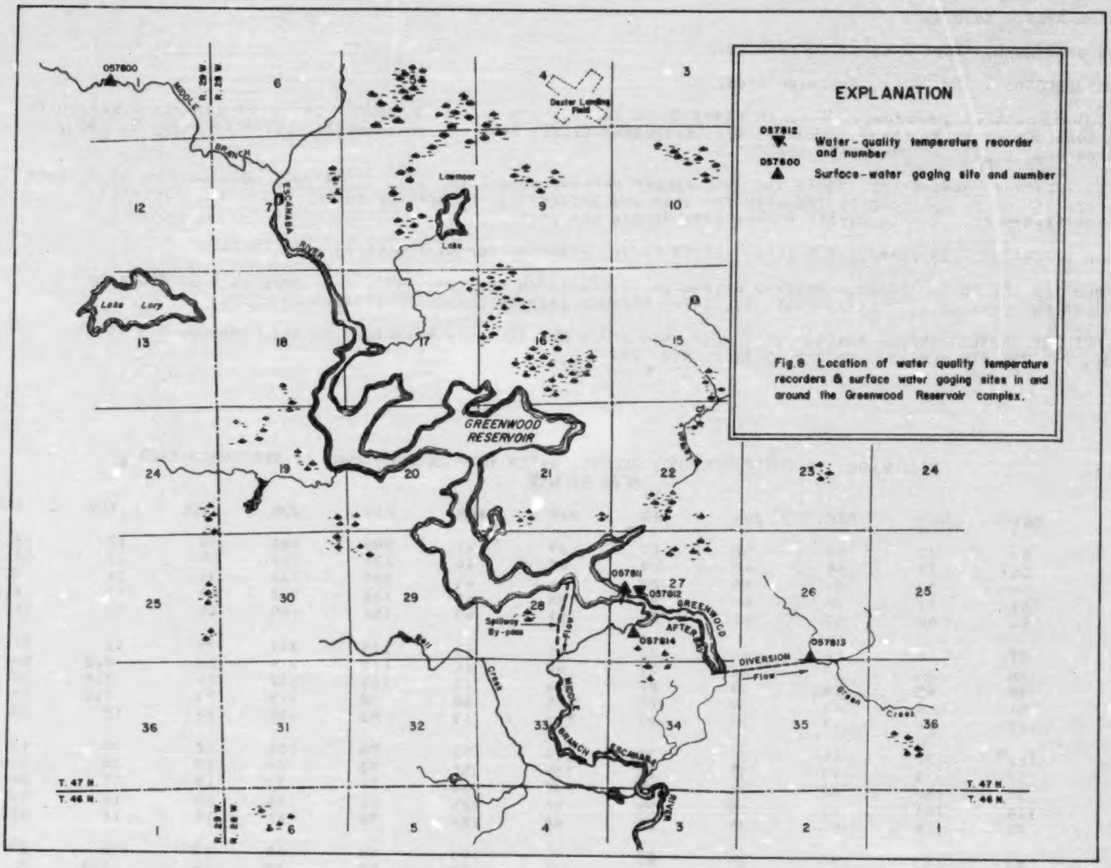
EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,640 ft^3/s Apr. 24, 1960, gage height, 8.30 ft, from floodmark; minimum, 4.0 ft^3/s Sept. 12, 1976; minimum gage height, 1.07 ft Aug. 24, 1960.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 970 ft^3/s May 30, gage height, 6.70 ft; minimum, 5.9 ft^3/s Aug. 26, 29; minimum gage height, 1.62 ft Aug. 29.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	59	83	59	52	29	27	41	299	496	38	12	12
2	56	77	68	48	29	27	44	239	342	35	11	10
3	69	73	84	45	29	26	44	207	262	34	14	8.7
4	61	71	76	44	29	28	43	178	342	57	17	8.0
5	54	68	67	41	28	37	43	154	485	49	13	14
6	57	66	64	40	28	51	45	133	341	35	10	37
7	78	63	58	40	27	84	44	117	239	26	8.2	54
8	75	65	54	39	27	94	45	104	182	24	7.6	34
9	67	64	49	38	27	115	48	92	146	23	7.0	19
10	117	60	47	38	27	115	49	83	125	22	12	28
11	162	72	45	37	26	110	52	78	105	20	39	45
12	152	119	43	37	26	105	52	73	90	19	30	36
13	139	168	42	36	25	100	63	71	77	18	19	26
14	118	161	41	36	25	90	125	76	69	16	14	19
15	99	128	41	35	25	80	184	70	61	14	11	15
16	83	98	39	35	25	75	199	64	65	13	10	22
17	73	90	38	34	25	71	189	59	62	14	9.4	31
18	67	76	38	34	25	68	161	54	56	14	9.0	28
19	66	91	38	33	25	64	138	52	50	12	8.3	25
20	125	149	37	33	26	64	123	54	46	12	7.7	86
21	224	176	37	33	26	60	134	58	43	11	7.1	136
22	223	154	36	32	26	58	164	98	55	11	8.0	99
23	177	123	36	32	25	56	190	321	50	10	8.3	74
24	165	99	38	32	25	54	223	423	42	9.7	7.1	55
25	156	90	70	32	25	50	264	287	44	8.9	6.8	41
26	152	73	90	31	26	48	336	198	47	8.5	6.5	35
27	138	68	74	31	25	47	490	142	52	8.0	7.4	29
28	133	60	60	31	27	46	574	109	52	7.6	7.1	25
29	129	59	66	30	---	45	471	169	44	7.8	36	22
30	114	57	62	30	---	44	372	601	40	7.5	42	19
31	95	---	56	30	---	41	---	794	---	11	20	---
TOTAL	3483	2801	1661	1119	738	1980	4950	5457	4110	596.0	425.5	1092.7
MEAN	112	93.4	53.6	36.1	26.4	63.9	165	176	137	19.2	13.7	36.4
MAX	224	176	90	52	29	115	574	794	496	57	42	136
MIN	54	57	36	30	25	26	41	52	40	7.5	6.5	8.0
CFSM	2.44	2.03	1.17	.79	.57	1.39	3.59	3.83	2.98	.42	.30	.79
IN.	2.82	2.27	1.34	.90	.60	1.60	4.00	4.41	3.32	.48	.34	.88

CAL YR 1982 TOTAL 27181.0 MEAN 74.5 MAX 734 MIN 14 CFSM 1.62 IN 21.98
WTR YR 1983 TOTAL 28413.2 MEAN 77.8 MAX 794 MIN 6.5 CFSM 1.69 IN 22.98



EXPLANATION
057812 Water-quality temperature recorder and number
057800 Surface-water gaging site and number
057800
MIDDLE BRANCH
ESCANABA RIVER
R. 29 W.
R. 28 W.
Dexter Landing Field
Lawmeer
Lake
Lake Lory
GREENWOOD RESERVOIR
057811
057812
057814
057813
GREENWOOD AFTERBAY
DIVERSION
Flow
Spillway By-pass
Flow
Bell Creek
Green Creek
MIDDLE BRANCH ESCANABA RIVER
T. 47 N.
T. 46 N.
1
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3
4
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7
8
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Fig.8 Location of water quality temperature recorders & surface water gaging sites in and around the Greenwood Reservoir complex.

Greenwood Reservoir is formed by an earth/rockfill main dam (Greenwood Dam) and several earthfill dikes surrounding the storage area. Storage began Dec. 22, 1972, and the fixed-crest concrete spillway was completed in September 1973. The usable capacity of the reservoir is 23,300 acre-ft at a spillway elevation of 1,515 ft. At pool elevation exceeding 1,515 ft, water flows over the spillway into the Middle Branch Escanaba River below Greenwood Release (04057814). At lower pool elevations, outflow from Greenwood Reservoir into Greenwood Afterbay is completely regulated by the multiport outlet of Greenwood Dam. Greenwood Afterbay has two outlets; one for diversion by pipeline into Green Creek and the second for releasing flows to Middle Branch Escanaba River. Water temperatures are measured directly below Greenwood Dam (Greenwood Afterbay, 04057812).

04057811 GREENWOOD RESERVOIR NEAR GREENWOOD, MI

LOCATION.--Lat 46°26'32", long 87°48'02", in NW1/4 SW1/4 sec.27, T.47 N., R.28 W., Marquette County, Hydrologic Unit 04030110, at downstream side of dam, on Middle Branch Escanaba River, 3.7 mi southwest of Greenwood.

DRAINAGE AREA.--67.4 mi^2.

PERIOD OF RECORD.--December 1972 to current year (monthend contents only).

GAGE.--Water-stage recorder. Datum of gage is 1,400.00 ft National Geodetic Vertical Datum of 1929 (levels by Cleveland-Cliffs Iron Co.); gage readings have been reduced to elevations NGVD. Prior to Feb. 20, 1973, nonrecording gage at same site and datum.

REMARKS.--The reservoir is formed by an earth/rockfill main dam and several earthfill dykes surrounding the storage area. Storage began Dec. 22, 1972. The fixed-crest concrete spillway was completed in September 1973. The usable capacity of the reservoir is 23,300 acre-ft at spillway elevation 1,515 ft. Above elevation 1,515 ft, water flows over concrete spillway into Middle Branch Escanaba River about 2,000 ft below Greenwood Release (station 04057814). The main dam is equipped with an outlet structure with 4 valves to control flow to afterbay (conservation pool) which has a capacity of 420 acre-ft at elevation 1,480 ft. Two outlet systems from the afterbay provide for diversion and release flow. Diverted flow to Green Creek gaged at Greenwood Diversion (station 04057813); released flow to Middle Branch Escanaba River gaged at Greenwood Release (station 04057814). Reservoir impounds water for diversion to Schweitzer Reservoir (station 04058190), for use in iron ore processing.

EXTREMES FOR PERIOD OF RECORD.--Maximum contents, 25,400 acre-ft Apr. 26, 27, 1979, elevation, 1,516.5 ft; minimum since first filling, 3,240 acre-ft Mar. 12, 1977, elevation, 1,491.1 ft.

EXTREMES FOR CURRENT YEAR.--Maximum contents, 24,840 acre-ft May 31, June 1, elevation, 1,516.1 ft; minimum, 20,100 acre-ft Sept. 17, 18, 19, 20, elevation, 1,512.5 ft.

MONTHEND ELEVATION, IN FEET NGVD, AND CONTENTS AT 2400, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

Date	Elevation (feet)	Contents (acre-feet)	Change in contents (acre-feet)	Change in contents (equivalent in ft^3/s)
Sept. 30	1515.2	23580	--	--
Oct. 31	1515.3	23720	+140	+2.3
Nov. 30	1515.2	23580	-140	-2.4
Dec. 31	1515.1	23440	-140	-2.3
CAL YR 1982	--	--	+1570	+2.2
Jan. 31	1515.1	23440	0	0
Feb. 28	1515.1	23440	0	0
Mar. 31	1515.1	23440	0	0
Apr. 30	1515.9	24560	+1120	+18.8
May 31	1516.1	24840	+280	+4.6
June 30	1515.1	23440	-1400	-23.5
July 31	1514.2	22260	-1180	-19.2
Aug. 31	1512.9	20580	-1680	-27.3
Sept. 30	1512.9	20580	0	0
WTR YR 1983	--	--	-3000	-4.1

04057812 GREENWOOD AFTERBAY NEAR GREENWOOD, MI

LOCATION.--Lat 46°26'32", long 87°48'02", in NW1/4 SW1/4 sec.27, T.47 N., R.28 W., Marquette County, Hydrologic Unit 04030110, in control house on downstream side of Greenwood Dam on the Middle Branch Escanaba River, 3.5 mi southwest of Greenwood.

DRAINAGE AREA.--67.4 mi^2.

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: January 1973 to current year.

INSTRUMENTATION.--Temperature recorder since Jan. 31, 1973.

REMARKS.--Flow regulated by the multi-port outlets of Greenwood Reservoir. Elevations of outlets are: (No. 1) 1,505 ft, (No. 2) 1,495 ft, (No. 3) 1,485 ft, (No. 4) 1,478 ft, National Geodetic Vertical Datum of 1929. Outlet No.3 was open Oct. 1 to Sept. 30.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum, 24.5°C July 14, 15, 1974; minimum, 0.0°C on many days during January to March 1973.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum, 19.0°C Aug. 29, Sept. 6, 7, 10-13; minimum, 1.0°C Dec. 7-11, 18-30.

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	13.0	13.0	7.0	7.0	2.0	2.0	1.5	1.5	1.5	1.5	2.0	2.0
2	13.0	13.0	7.0	7.0	2.0	2.0	1.5	1.5	1.5	1.5	2.0	2.0
3	13.0	13.0	7.0	6.5	2.0	1.5	1.5	1.5	1.5	1.5	2.0	2.0
4	13.0	13.0	6.5	6.5	1.5	1.5	1.5	1.5	1.5	1.5	2.0	2.0
5	13.0	13.0	6.5	5.5	1.5	1.5	1.5	1.5	1.5	1.5	2.0	2.0
6	13.0	13.0	5.5	5.5	1.5	1.5	1.5	1.5	1.5	1.5	2.0	2.0
7	13.0	13.0	5.5	5.0	1.5	1.0	1.5	1.5	1.5	1.5	2.0	2.0
8	13.0	13.0	5.0	5.0	1.0	1.0	1.5	1.5	1.5	1.5	2.0	2.0
9	13.0	12.5	5.0	5.0	1.0	1.0	1.5	1.5	1.5	1.5	2.0	2.0
10	12.5	12.5	5.0	5.0	1.0	1.0	1.5	1.5	1.5	1.5	2.0	2.0
11	12.5	12.0	5.0	5.0	1.5	1.0	1.5	1.5	1.5	1.5	2.0	2.0
12	12.0	12.0	5.0	4.5	1.5	1.5	1.5	1.5	1.5	1.5	2.0	2.0
13	12.0	12.0	4.5	4.0	1.5	1.5	1.5	1.5	1.5	1.5	2.0	2.0
14	12.0	11.5	4.0	4.0	1.5	1.5	1.5	1.5	1.5	1.5	2.0	2.0
15	11.5	11.0	4.0	3.0	1.5	1.5	1.5	1.5	1.5	1.5	2.0	2.0
16	11.0	10.5	3.0	3.0	1.5	1.5	1.5	1.5	2.0	1.5	2.0	2.0
17	10.5	10.5	3.0	3.0	1.5	1.5	1.5	1.5	2.0	2.0	2.0	2.0
18	10.5	10.5	3.0	3.0	1.5	1.0	1.5	1.5	2.0	2.0	2.0	2.0
19	10.5	10.5	3.0	3.0	1.0	1.0	1.5	1.5	2.0	2.0	2.0	2.0
20	10.5	10.5	3.0	3.0	1.0	1.0	1.5	1.5	2.0	2.0	2.0	2.0
21	9.5	9.0	3.0	3.0	1.0	1.0	1.5	1.5	2.0	2.0	2.0	2.0
22	9.0	8.5	3.0	3.0	1.0	1.0	1.5	1.5	2.0	2.0	2.0	2.0
23	8.5	8.0	3.0	3.0	1.0	1.0	1.5	1.5	2.0	2.0	2.0	2.0
24	8.0	8.0	3.0	2.0	1.0	1.0	1.5	1.5	2.0	2.0	2.0	2.0
25	8.0	7.5	2.0	2.0	1.0	1.0	1.5	1.5	2.0	2.0	2.0	2.0
26	7.5	7.5	2.0	1.5	1.0	1.0	1.5	1.5	2.0	2.0	2.0	2.0
27	7.5	7.5	2.0	1.5	1.0	1.0	1.5	1.5	2.0	2.0	2.0	2.0
28	7.5	7.5	2.0	2.0	1.0	1.0	1.5	1.5	2.0	2.0	2.0	2.0
29	7.5	7.5	2.0	2.0	1.0	1.0	1.5	1.5	---	---	2.0	2.0
30	7.5	7.5	2.0	2.0	1.5	1.0	1.5	1.5	---	---	2.0	2.0
31	7.5	7.0	---	---	1.5	1.5	1.5	1.5	---	---	2.0	2.0
MONTH	13.0	7.0	7.0	1.5	2.0	1.0	1.5	1.5	2.0	1.5	2.0	2.0

04057812 GREENWOOD AFTERBAY NEAR GREENWOOD,MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	2.0	2.0	3.0	3.0	10.5	10.0	11.5	11.5	15.0	14.5	18.5	18.0
2	2.0	2.0	3.5	3.0	10.5	10.5	12.0	11.5	15.0	15.0	18.0	18.0
3	2.0	2.0	4.0	3.5	11.0	10.5	12.0	11.5	15.0	15.0	18.0	18.0
4	2.0	2.0	4.0	4.0	11.0	11.0	11.5	11.5	15.0	15.0	18.0	18.0
5	2.0	2.0	4.5	4.0	11.5	11.0	11.5	11.5	15.5	15.0	18.5	18.0
6	2.0	2.0	4.5	4.5	12.5	11.5	12.0	11.5	15.5	15.0	19.0	18.5
7	2.0	2.0	5.5	4.5	12.5	12.5	12.0	11.5	15.5	15.0	19.0	18.5
8	2.0	2.0	6.0	5.5	12.5	12.5	12.0	12.0	15.5	15.0	18.5	18.5
9	2.0	2.0	6.0	6.0	12.5	12.0	12.0	12.0	15.5	15.0	18.5	18.5
10	2.0	2.0	6.0	6.0	12.0	12.0	12.0	12.0	15.5	15.5	19.0	18.5
11	2.0	2.0	6.5	6.0	12.0	12.0	12.5	12.0	16.0	15.5	19.0	19.0
12	2.0	2.0	6.0	6.0	12.0	12.0	12.5	12.0	16.0	15.5	19.0	19.0
13	2.0	2.0	6.0	6.0	12.0	12.0	12.5	12.0	16.0	16.0	19.0	18.0
14	2.0	2.0	6.0	6.0	12.0	11.5	12.5	12.5	16.0	15.5	18.0	18.0
15	2.0	2.0	6.0	6.0	11.5	11.5	13.0	12.5	16.0	16.0	18.0	17.5
16	2.0	2.0	6.5	6.0	11.5	11.5	13.0	13.0	16.5	16.0	17.5	17.5
17	2.0	2.0	6.5	6.0	11.5	11.5	13.0	13.0	16.5	16.0	17.5	16.5
18	2.0	2.0	6.5	6.0	11.5	11.5	13.5	12.5	16.5	16.5	17.0	17.0
19	2.0	2.0	6.5	6.0	11.5	11.5	13.5	13.0	17.5	16.5	17.0	16.5
20	2.0	2.0	6.5	6.0	11.5	11.5	13.5	13.5	17.0	16.5	16.5	16.0
21	2.0	2.0	7.0	6.5	11.5	11.5	14.0	13.5	17.0	16.5	16.0	15.5
22	2.0	2.0	7.0	6.5	11.5	11.5	14.0	13.5	17.0	17.0	15.5	15.5
23	2.0	2.0	7.0	6.5	11.5	11.5	14.0	14.0	17.0	17.0	15.5	15.0
24	2.0	2.0	7.0	7.0	11.5	11.5	14.0	14.0	17.0	17.0	15.0	14.5
25	2.0	2.0	9.0	7.0	11.5	11.5	14.5	14.0	17.0	17.0	14.5	14.0
26	2.5	2.0	8.5	7.5	11.5	11.5	14.5	14.5	18.0	17.0	14.0	14.0
27	2.5	2.5	9.0	8.5	11.5	11.5	14.5	14.5	18.0	17.5	14.0	14.0
28	2.5	2.5	9.0	8.5	12.0	11.5	14.5	14.5	18.0	17.0	14.0	14.0
29	3.0	2.5	9.5	8.5	12.0	11.5	14.5	14.5	19.0	17.0	14.0	14.0
30	3.0	3.0	9.5	9.5	11.5	11.5	15.5	14.0	18.0	18.0	14.0	14.0
31	---	---	10.5	9.5	---	---	15.0	14.5	18.0	18.0	---	---
MONTH	3.0	2.0	10.5	3.0	12.5	10.0	15.5	11.5	19.0	14.5	19.0	14.0

04057813 GREENWOOD DIVERSION NEAR GREENWOOD, MI

LOCATION.--Lat 46°26'04", long 87°46'10", in NW1/4 NE1/4 sec.35, T.47 N., R.28 W., Marquette County, Hydrologic Unit 04030110, on left bank at downstream end of pipeline, 200 ft upstream from Green Creek, 0.7 mi downstream from Greenwood Afterbay, and 3.6 mi south of Greenwood.

PERIOD OF RECORD.--December 1972 to current year.

GAGE.--Water-stage recorder and concrete flume. Datum of gage is 1,454.57 ft National Geodetic Vertical Datum of 1929 (Cleveland-Cliffs Iron Co. benchmark). Prior to Aug. 22, 1973, nonrecording gage at same site and datum.

REMARKS.--Records excellent except those below 5 ft^3/s, which are good. Flow completely regulated. A pipeline, 0.7 mi long, diverts water from Greenwood Reservoir (station 04057811) into Green Creek, tributary to Schweitzer Reservoir (station 04058190). Water is used for iron ore processing; some returned to Middle Branch Escanaba River 27 mi downstream via another Green Creek; some returned 31 mi downstream via Goose Lake Outlet (station 04058400) and East Branch Escanaba River. Several observations of water temperature were made during the year.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 30 ft^3/s June 25-28, 1977, Nov. 9, 1979; no flow Dec. 27, 1972 to Jan. 6, 1973; minimum daily discharge since diversion began, 0.02 ft^3/s Nov. 3-22, 1977.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.6	1.5	4.1	10	10	10	10	10	1.9	1.7	12	26
2	1.6	1.5	5.4	10	10	10	10	10	1.9	1.7	12	26
3	1.6	1.5	6.5	10	10	10	10	10	1.9	1.7	12	26
4	1.6	1.5	6.5	10	10	10	10	10	1.9	1.8	12	26
5	1.6	1.4	6.5	10	10	10	10	10	1.8	1.8	12	26
6	1.6	1.4	6.5	10	10	10	10	10	1.8	1.8	12	26
7	1.6	1.4	6.5	10	10	11	10	10	1.8	1.8	12	26
8	1.6	1.4	6.5	10	10	11	10	10	1.8	1.8	12	26
9	1.6	1.4	6.4	10	10	11	9.9	10	1.8	1.8	12	26
10	1.6	1.4	6.4	10	10	11	9.9	10	1.8	1.8	12	26
11	1.6	1.4	6.4	10	10	11	9.9	10	1.8	5.6	12	26
12	1.6	1.5	6.3	10	10	11	9.9	10	1.7	11	12	26
13	1.6	1.4	6.2	10	10	10	9.9	10	1.7	11	12	26
14	1.6	1.4	6.4	10	10	10	10	10	1.7	11	12	26
15	1.6	1.4	6.4	10	10	10	10	10	1.7	11	13	26
16	1.5	1.4	6.4	10	10	10	10	10	1.7	11	14	26
17	1.5	1.4	7.7	10	10	10	10	10	1.7	11	14	26
18	1.5	1.4	8.5	10	10	10	10	10	1.7	11	14	26
19	1.5	1.4	8.5	10	10	10	10	10	1.7	12	14	26
20	1.6	1.4	8.4	10	10	10	10	10	1.7	12	14	26
21	1.5	1.4	8.5	10	10	10	10	10	1.7	12	14	26
22	1.5	1.4	9.3	10	10	10	10	10	1.7	12	14	26
23	1.5	1.4	10	10	10	10	10	4.2	1.7	12	14	26
24	1.5	1.4	10	10	10	10	10	2.0	1.7	12	14	26
25	1.5	1.4	10	10	10	10	10	2.0	1.7	12	17	26
26	1.5	1.4	10	10	10	9.9	10	6.4	1.7	12	26	25
27	1.5	1.4	10	10	10	10	10	10	1.7	12	27	23
28	1.5	1.4	10	10	10	10	10	10	1.7	12	26	23
29	1.5	2.5	10	10	---	10	10	11	1.7	12	25	23
30	1.5	4.1	10	10	---	10	10	5.4	1.7	12	25	23
31	1.5	---	10	10	---	10	---	1.8	---	12	25	---
TOTAL	48.1	46.3	240.3	310	280	315.9	299.5	272.8	52.5	256.3	478	767
MEAN	1.55	1.54	7.75	10.0	10.0	10.2	9.98	8.80	1.75	8.27	15.4	25.6
MAX	1.6	4.1	10	10	10	11	10	11	1.9	12	27	26
MIN	1.5	1.4	4.1	10	10	9.9	9.9	1.8	1.7	1.7	12	23

CAL YR 1982 TOTAL 3015.9 MEAN 8.28 MAX 27 MIN 1.4
WTR YR 1983 TOTAL 3366.7 MEAN 9.22 MAX 27 MIN 1.4

04057814 GREENWOOD RELEASE NEAR GREENWOOD, MI

LOCATION.--Lat 46°26'22", long 87°47'52", in NW1/4 SW1/4 sec.27, T.47 N., R.28 W., Marquette County, Hydrologic Unit 04030110, on left bank at outlet of Greenwood Afterbay releasing to Middle Branch Escanaba River, 2.6 mi upstream from Bell Creek and 3.8 mi southwest of Greenwood.

DRAINAGE AREA.--67.4 mi^2.

PERIOD OF RECORD.--October 1972 to current year.

GAGE.--Water-stage recorder and concrete flume. Datum of gage is 1,473.77 ft National Geodetic Vertical Datum of 1929 (Cleveland-Cliffs Iron Co. benchmark). Prior to Nov. 7, 1973, nonrecording gage at same site and different datum.

REMARKS.--Records good. Since December 1972, flow from Greenwood Reservoir (station 04057811) below spillway elevation 1,515 ft is completely regulated by the afterbay release structure into the Middle Branch Escanaba River. Since January 1973, water diverted immediately above this station via Greenwood Diversion (station 04057813) to Green Creek for iron ore processing and some returned to Middle Branch Escanaba River 27mi downstream via another Green Creek. Since October 1979, some of the diversion returned 31 mi downstream via Goose Lake Outlet (station 04058400) and East Branch Escanaba River. Overflow from the reservoir spillway bypasses and returns to the Middle Branch Escanaba River 0.5 mi downstream from this station. Several observations of water temperature were made during the year.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge (prior to regulation), 290 ft^3/s Oct. 1, 1972; (since regulation began), 63 ft^3/s July 10, 11, 1974; minimum daily, 10 ft^3/s Dec. 29, 30, 1972, result of construction.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	28	25	28	28	28	28	26	27	29	26	26	25
2	28	30	29	28	28	28	26	26	29	26	26	25
3	28	33	29	28	28	28	26	26	28	26	26	25
4	28	30	28	28	28	28	26	26	28	26	26	25
5	28	28	28	28	28	28	26	26	28	26	26	25
6	28	27	28	28	28	28	26	26	27	26	26	26
7	28	28	28	29	28	29	26	26	27	26	27	26
8	28	28	28	29	28	29	26	26	27	26	27	26
9	28	28	28	29	28	29	26	26	27	26	26	26
10	29	28	27	28	28	29	26	26	26	26	27	26
11	29	28	27	28	28	29	25	26	26	26	27	26
12	28	29	27	28	28	29	25	26	26	26	27	26
13	27	29	27	28	28	29	25	26	26	27	27	26
14	27	29	27	28	28	29	26	26	26	26	27	26
15	27	29	28	28	28	28	26	26	26	26	27	26
16	26	29	28	28	28	27	26	26	26	26	27	26
17	26	29	28	28	28	27	26	26	26	26	27	26
18	26	29	28	28	28	27	26	26	26	26	27	26
19	26	29	27	28	28	27	26	27	26	26	27	26
20	26	29	27	28	28	27	26	26	26	25	28	27
21	26	29	28	28	28	27	26	27	26	25	28	27
22	26	29	28	28	28	27	27	27	26	25	28	27
23	26	29	28	28	28	27	27	27	26	24	27	27
24	26	29	28	28	28	27	27	27	26	24	27	27
25	26	29	28	28	28	26	27	27	26	24	28	27
26	26	29	28	28	28	26	27	26	26	25	33	27
27	26	29	28	28	28	26	27	26	26	26	29	27
28	26	29	28	28	28	26	27	26	26	26	26	27
29	26	29	28	28	---	26	27	27	26	26	26	27
30	26	28	28	28	---	26	27	28	26	26	25	27
31	25	---	28	28	---	26	---	29	---	26	25	---
TOTAL	834	863	863	871	784	853	786	819	796	797	836	786
MEAN	26.9	28.8	27.8	28.1	28.0	27.5	26.2	26.4	26.5	25.7	27.0	26.2
MAX	29	33	29	29	28	29	27	29	29	27	33	27
MIN	25	25	27	28	28	26	25	26	26	24	25	25

CAL YR 1982 TOTAL 9835 MEAN 26.9 MAX 33 MIN 24
WTR YR 1983 TOTAL 9888 MEAN 27.1 MAX 33 MIN 24

04058190 SCHWEITZER RESERVOIR NEAR PALMER, MI

LOCATION.--Lat 46°25'00", long 87°38'48", in SE1/4 NW1/4 sec.2, T.46 N., R.27 W., Marquette County, Hydrologic Unit 04030110, on left bank 120 ft upstream from dam on Schweitzer Creek, and 3.0 mi southwest of Palmer.

DRAINAGE AREA.--23.1 mi^2.

PERIOD OF RECORD.--January 1963 to current year (monthend contents only).

GAGE.--Water-stage recorder. Datum of gage is 1,300.00 ft National Geodetic Vertical Datum of 1929 (Cleveland-Cliffs Iron Co. reference mark); gage readings have been reduced to elevations NGVD. Prior to Oct. 25, 1967, nonrecording gage at same site and datum.

REMARKS.--Reservoir is formed by an earthfill dam with fixed crest concrete spillway completed in 1963. Usable capacity of reservoir is 5,300 acre-ft at spillway elevation, 1,338.00 ft. The dam includes a discharge pipe equipped with valve to control release flow to Schweitzer Creek (station 04058200). An average of 2.3 ft^3/s was diverted from the headwaters of basin by the city of Ishpeming for municipal supply and the effluent discharged to the Carp River basin. An average of 21 ft^3/s was diverted from reservoir for iron ore processing, some returned to Middle Branch Escanaba River basin via Green Creek and some returned to the East Branch Escanaba River basin via Goose Lake Outlet. Since January 1973, controlled diversion from Greenwood Reservoir (station 04057811) via Greenwood Diversion (station 04057813) into Schweitzer Reservoir. Controlled inflow averaged 10.5 ft^3/s for the year.

EXTREMES FOR PERIOD OF RECORD.--Maximum contents recorded, 5,900 acre-ft May 31, 1970, elevation, 1,339.5 ft; minimum recorded since first filling, 2,920 acre-ft Apr. 10, 1974, elevation, 1,329.7 ft.

EXTREMES FOR CURRENT YEAR.--Maximum contents, 5,660 acre-ft May 30, elevation, 1,338.9 ft; minimum, 3,810 acre-ft Sept. 9, elevation, 1,333.2 ft.

MONTHEND ELEVATION, IN FEET NGVD, AND CONTENTS AT 2400, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

Date	Elevation (feet)	Contents acre-feet)	Change in contents (acre-feet)	Change in contents (equivalent in ft /s)
Sept. 30	1338.1	5340	--	--
Oct. 31	1338.1	5340	0	0
Nov. 30	1337.5	5120	-220	-3.7
Dec. 31	1337.0	4950	-170	-2.8
CAL YR 1982	--	--	+690	+1.0
Jan. 31	1335.8	4590	-360	-5.9
Feb. 28	1335.1	4380	-210	-3.8
Mar. 31	1338.0	5300	+920	+15.0
Apr. 30	1338.5	5500	+200	+3.4
May 31	1338.6	5540	+40	+0.6
June 30	1336.7	4860	-680	-11.4
July 31	1334.6	4230	-630	-10.2
Aug. 31	1333.6	3930	-300	-4.9
Sept. 30	1336.0	4650	+720	+12.1
WTR YR 1983	--	--	-690	-1.0

04058200 SCHWEITZER CREEK NEAR PALMER, MI

LOCATION.--Lat 46°24'40", long 87°37'27", in SW1/4 sec.1, T.46 N., R.27 W., Marquette County, Hydrologic Unit 04030110, on right bank 10 ft upstream from highway bridge, and 2.5 mi southwest of Palmer.

DRAINAGE AREA.--23.6 mi^2.

PERIOD OF RECORD.--October 1960 to current year.

GAGE.--Water-stage recorder. Concrete control since Oct. 1, 1963. Altitude of gage is 1,270 ft from topographic map (nearest 10 ft). Prior to Aug. 21, 1961, nonrecording gage at same site and datum.

REMARKS.--Records good, except those for period of no gage-height record, May 30 to June 8, which are fair. Since August 1962, flow completely regulated by Schweitzer Reservoir (station 04058190) 1.0 mi upstream. An average of 2.3 ft^3/s was diverted from headwaters of basin by the city of Ishpeming for municipal supply and the effluent discharged to the Carp River basin. An average of 21 ft^3/s was diverted from Schweitzer Reservoir by industry for iron ore processing, some returned to the Middle Branch Escanaba River via Green Creek and some returned via Goose Lake Outlet (station 04058400) and East Branch Escanaba River. Diversion into Schweitzer Reservoir from Greenwood Reservoir via Greenwood Diversion (station 04057813). Several observations of water temperature were made during the year.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 860 ft^3/s May 31, 1970, gage height, 6.50 ft; minimum, 0.4 ft^3/s Sept. 6, 1962, gage height, 1.22 ft; minimum daily, 1.0 ft^3/s Apr. 9-18, May 5, 6, 1963.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 295 ft^3/s May 30, gage height, 4.86 ft, from high-water mark; minimum daily, 5.2 ft^3/s Sept. 8, 9.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	13	11	5.9	5.6	5.4	5.4	6.4	65	174	6.3	5.9	5.5
2	11	11	5.9	5.6	5.4	5.4	6.6	53	103	6.3	5.9	5.5
3	12	11	5.9	5.6	5.5	5.6	8.0	42	72	6.6	6.8	5.5
4	11	11	5.9	5.6	5.5	5.7	9.3	37	98	6.9	6.6	5.7
5	9.3	13	6.1	5.6	5.4	5.7	8.8	31	117	6.7	6.5	5.9
6	10	10	6.0	5.7	5.4	6.3	9.5	28	90	7.2	6.4	5.8
7	15	9.6	5.9	5.6	5.3	7.2	11	29	70	7.2	6.3	5.6
8	16	10	5.7	5.6	5.4	7.4	11	26	46	7.0	6.3	5.2
9	13	9.5	5.6	5.6	5.3	7.5	12	23	28	6.3	6.3	5.2
10	27	10	5.6	5.6	5.4	6.4	17	18	26	6.0	7.4	5.7
11	43	13	5.5	5.6	5.4	6.4	18	15	21	5.9	6.5	5.4
12	35	32	5.6	5.6	5.4	6.4	17	12	13	5.9	5.9	5.4
13	27	38	5.6	5.6	5.4	6.3	24	11	9.7	5.9	5.8	5.4
14	22	37	5.6	5.6	5.4	6.4	62	12	7.7	5.9	5.7	5.5
15	18	27	5.6	5.6	5.4	6.2	105	10	7.1	5.9	5.9	5.5
16	15	18	5.6	5.6	5.4	6.2	92	8.8	7.1	5.9	6.1	6.0
17	11	14	5.6	5.6	5.4	6.1	67	8.0	6.9	5.9	6.0	5.6
18	11	12	5.6	5.6	5.4	7.5	52	7.5	6.7	5.8	6.3	5.6
19	11	14	5.6	5.5	5.4	12	42	7.7	6.9	5.9	6.1	5.6
20	27	29	5.6	5.4	5.4	14	41	8.2	6.7	5.8	6.0	7.8
21	40	35	5.6	5.3	5.4	13	48	8.0	6.6	5.9	6.1	5.8
22	34	22	5.6	5.5	5.4	11	65	12	6.7	5.8	5.9	5.6
23	28	13	5.7	5.6	5.4	9.3	73	54	6.5	5.8	5.9	5.7
24	24	7.2	5.9	5.6	5.4	8.3	79	60	6.5	5.8	5.9	5.4
25	21	5.9	6.7	5.4	5.4	7.7	98	46	6.5	5.7	6.0	5.6
26	17	5.9	6.0	5.3	5.4	7.2	120	36	6.4	5.7	6.0	5.5
27	15	5.8	5.9	5.4	5.4	7.2	138	20	6.4	5.6	5.9	5.5
28	15	5.9	6.0	5.4	5.5	6.9	130	16	6.4	5.9	5.5	5.5
29	15	5.9	5.7	5.5	---	6.2	99	60	6.4	6.0	5.8	5.5
30	14	5.9	5.6	5.6	---	6.2	76	252	6.3	6.0	5.7	5.5
31	12	---	5.6	5.4	---	6.2	---	244	---	6.3	5.6	---
TOTAL	592.3	452.6	178.7	171.8	151.3	229.3	1545.6	1260.2	981.5	189.8	189.0	169.0
MEAN	19.1	15.1	5.76	5.54	5.40	7.40	51.5	40.7	32.7	6.12	6.10	5.63
MAX	43	38	6.7	5.7	5.5	14	138	252	174	7.2	7.4	7.8
MIN	9.3	5.8	5.5	5.3	5.3	5.4	6.4	7.5	6.3	5.6	5.5	5.2

CAL YR 1982 TOTAL 6102.4 MEAN 16.7 MAX 228 MIN 4.8
WTR YR 1983 TOTAL 6111.1 MEAN 16.7 MAX 252 MIN 5.2

04059000 ESCANABA RIVER AT CORNELL, MI
(National stream-quality accounting network station)

LOCATION.--Lat 45°54'31", long 87°12'49", in NW1/4 sec.32, T.41 N., R.23 W., Delta County, Hydrologic Unit 04030110, on right bank 50 ft downstream from bridge on County Road 519, 0.4 mi downstream from Bobs Creek, 0.7 mi northeast of Cornell, and 16 mi upstream from mouth.

DRAINAGE AREA.--870 mi^2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--August 1903 to December 1912, January 1913 to November 1915 (gage heights only), October 1950 to current year. Monthly discharge only for some periods, published in WSP 1307. Published as "near Escanaba" 1903-15.

REVISED RECORDS.--WSP 1387: 1904.

GAGE.--Water-stage recorder. Datum of gage is 749.26 ft National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). August 1903 to November 1915, nonrecording gage at site 10 mi downstream at different datum.

REMARKS.--Water-discharge records good except those for the winter period, which are fair. Since 1950, diurnal fluctuation and occasional slight regulation by Boney Falls powerplant 7 mi upstream. Since August 1962, some regulation by Schweitzer Reservoir (station 04058190) about 50 mi upstream. Since December 1972, some regulation by Greenwood Reservoir (station 04057811) about 60 mi upstream.

AVERAGE DISCHARGE.--42 years (water years 1904-12, 1951-83), 891 ft^3/s, 13.91 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 10,700 ft^3/s Apr. 26, 1979, gage height, 5.00 ft; maximum gage height, 6.40 ft Apr. 9, 1971, backwater from ice; minimum discharge observed, 90 ft^3/s July 5, 1910, gage height, 1.5 ft, site and datum then in use, but may have been less during extended periods of no gage-height record during winter periods of 1903-12, or periods of ice effect in 1959.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 4,900 ft^3/s Apr. 15; maximum gage height, 3.70 ft Feb. 5, backwater from ice, Apr. 15; minimum daily discharge, 311 ft^3/s July 26.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	920	941	832	850	460	472	812	2570	4050	546	409	412
2	879	802	879	750	460	480	864	2370	3710	459	427	360
3	855	931	1060	640	420	540	954	2230	3230	469	408	319
4	832	827	1110	580	380	540	972	2010	3040	625	383	312
5	911	895	1130	620	400	640	966	1760	3240	768	382	325
6	1060	773	1200	550	450	800	999	1610	3150	619	320	384
7	1190	731	1000	450	430	1200	1040	1750	2820	579	323	418
8	1270	745	650	550	430	2000	1070	2130	2360	538	312	490
9	1140	837	420	600	410	2700	1180	2080	2030	508	312	449
10	1320	754	500	580	400	2250	1370	1830	1810	472	323	423
11	2030	836	450	540	420	2100	1600	1570	1530	441	467	415
12	2120	1460	600	500	430	2000	1630	1410	1350	453	593	381
13	1820	2120	400	600	420	1900	2100	1320	1180	423	536	405
14	1560	2080	550	640	430	1810	3360	1300	1070	355	462	400
15	1410	2170	580	620	430	1720	4720	1260	946	329	410	370
16	1250	2020	550	580	480	1500	4110	1180	954	328	388	359
17	1160	1510	500	550	480	1380	3310	1070	1000	337	371	428
18	1100	1250	550	500	460	1290	2710	1010	973	346	330	479
19	870	1230	480	520	460	1120	2210	946	871	354	320	487
20	921	1660	400	520	480	1090	2110	932	840	346	350	773
21	1260	1880	480	520	480	1130	2020	995	679	312	380	1490
22	1640	1840	420	520	480	1060	2150	1020	662	337	400	1540
23	1610	1640	680	520	480	1040	2340	1720	742	339	430	1460
24	1540	1380	700	520	480	981	2420	2340	763	328	460	1150
25	1370	1360	1020	500	420	912	2470	2580	665	316	480	872
26	1240	1050	1420	480	320	970	2580	2430	604	311	520	742
27	1140	816	1520	450	650	959	2850	2050	580	313	503	648
28	1140	1020	1300	420	560	870	2980	1660	565	316	487	587
29	1070	896	1100	450	---	795	3020	1800	562	312	429	525
30	1060	877	880	480	---	823	2800	3060	532	317	410	457
31	978	---	850	460	---	788	---	3980	---	359	440	---
TOTAL	38666	37331	24211	17060	12600	37860	63717	55973	46508	12855	12765	17860
MEAN	1247	1244	781	550	450	1221	2124	1806	1550	415	412	595
MAX	2120	2170	1520	850	650	2700	4720	3980	4050	768	593	1540
MIN	832	731	400	420	320	472	812	932	532	311	312	312
CFSM	1.43	1.43	.90	.63	.52	1.40	2.44	2.08	1.78	.48	.47	.68
IN.	1.65	1.60	1.04	.73	.54	1.62	2.72	2.39	1.99	.55	.55	.76

CAL YR 1982 TOTAL 365243 MEAN 1001 MAX 5740 MIN 250 CFSM 1.15 IN 15.62
WTR YR 1983 TOTAL 377406 MEAN 1034 MAX 4720 MIN 311 CFSM 1.19 IN 16.14

04059000 ESCANABA RIVER AT CORNELL, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1969-73, 1975 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: February 1975 to September 1981. From October 1975 to September 1981, daily figures of instrument-recorded conductance below 200 micromhos are not representative because of variability within the stream cross section. Results of a study of this variance are available in the District files.
WATER TEMPERATURES: February 1975 to September 1981.

INSTRUMENTATION.--Water-quality monitor October 1975 to September 1981.

REMARKS.--Bimonthly samples were collected during the year as a cross-section sample in the reach of stream from the bridge on County Road 519 to a point 200 ft downstream. Complete ice cover during winter period.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum daily (water years 1975-76, 1978-80), 360 micromhos Sept. 10, 1975; minimum observed (water years 1975-76, 1978-81), 114 micromhos Apr. 15, 1981.
WATER TEMPERATURES: Maximum daily, 35.0°C July 31, 1975; minimum, 0.0°C on many days during winter periods.

EXTREMES OUTSIDE PERIOD OF DAILY RECORD.--A specific conductance of 84 micromhos was observed Apr. 28, 1982.

WATER QUALITY DATA, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DATE	TIME	STREAM-FLOW, INSTANTANEOUS (CFS)	SPECIFIC CONDUCTANCE (UMHOS)	PH (STANDARD UNITS)	TEMPERATURE (DEG C)	TURBIDITY (NTU)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)	COLIFORM, FECAL, 0.7 UM-MF (COLS./100 ML)	STREPTOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)
NOV										
02...	1300	759	166	8.2	7.0	1.9	12.2	104	K1	40
JAN										
18...	1140	600	212	7.7	.0	2.1	14.6	101	K5	69
MAR										
01...	1130	472	222	8.0	.0	1.6	14.3	101	K2	18
MAY										
03...	1155	2280	114	8.0	8.0	1.6	11.8	104	<2	34
JUL										
06...	1330	595	192	8.4	22.0	2.5	10.2	119	K9	420
SEP										
08...	1125	495	252	8.3	19.0	2.0	10.3	114	K15	160

DATE	HARDNESS (MG/L AS CACO3)	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	PERCENT SODIUM	SODIUM ADSORPTION RATIO	POTASSIUM, DISSOLVED (MG/L AS K)	ALKALINITY LAB (MG/L AS CACO3)	CARBON DIOXIDE DISSOLVED (MG/L AS CO2)
NOV									
02...	78	19	7.4	2.1	6	.1	.4	74	.9
JAN									
18...	100	24	9.8	6.7	13	.3	.9	98	3.8
MAR									
01...	113	27	11	9.4	15	.4	.9	109	2.1
MAY									
03...	50	12	4.8	3.3	12	.2	.7	47	.9
JUL									
06...	100	24	9.7	4.8	9	.2	.9	92	.7
SEP									
08...	92	22	9.0	17	28	.8	1.0	104	1.0

DATE	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, DISSOLVED (MG/L AS F)	SILICA, DISSOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	SOLIDS, DISSOLVED (TONS PER AC-FT)	SOLIDS, DISSOLVED (TONS PER DAY)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N)
NOV									
02...	13	3.2	.1	6.6	115	97	.16	236	<.10
JAN									
18...	15	4.2	<.1	9.8	130	130	.18	176	.30
MAR									
01...	17	4.4	.1	10	157	145	.21	200	.24
MAY									
03...	11	2.9	<.1	5.8	80	69	.11	492	.14
JUL									
06...	12	3.5	.1	7.5	147	118	.20	236	.10
SEP									
08...	20	5.6	.1	9.7	166	147	.23	222	<.10

04059000 ESCANABA RIVER AT CORNELL, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DATE	NITROGEN, AMMONIA DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS, DISSOLVED (MG/L AS P)	PHOSPHORUS, ORTHO, DISSOLVED (MG/L AS P)	PHOSPHATE, ORTHO, DISSOLVED (MG/L AS PO4)	SEDIMENT, SUSPENDED (MG/L)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
NOV									
02...	.080	1.80	--	.090	.040	.12	2	4.1	100
JAN									
18...	.030	.20	.190	<.010	<.010	--	3	4.1	100
MAR									
01...	.040	.40	.010	<.010	<.010	--	2	2.5	100
MAY									
03...	.020	.40	.020	<.010	<.010	--	1	6.2	98
JUL									
06...	<.010	.60	.040	.020	<.010	--	1	1.6	100
SEP									
08...	<.010	.24	.020	.010	<.010	--	1	1.3	100

DATE	TIME	ALUMINUM, DISSOLVED (UG/L AS AL)	ARSENIC DISSOLVED (UG/L AS AS)	BARIUM, DISSOLVED (UG/L AS BA)	BERYLLIUM, DISSOLVED (UG/L AS BE)	CADMIUM DISSOLVED (UG/L AS CD)	CHROMIUM, DISSOLVED (UG/L AS CR)	COBALT, DISSOLVED (UG/L AS CO)	COPPER, DISSOLVED (UG/L AS CU)	IRON, DISSOLVED (UG/L AS FE)	LEAD, DISSOLVED (UG/L AS PB)
NOV											
02...	1300	30	<1	15	<1	1	<1	4	1	510	3
JAN											
18...	1140	10	1	19	<1	1	3	<3	2	420	3
MAY											
03...	1155	80	1	11	<1	<1	<1	<3	1	440	5
JUL											
06...	1330	20	1	28	<1	<1	<1	<3	1	410	2

DATE	LITHIUM DISSOLVED (UG/L AS LI)	MANGANESE, DISSOLVED (UG/L AS MN)	MERCURY DISSOLVED (UG/L AS HG)	MOLYBDENUM, DISSOLVED (UG/L AS MO)	NICKEL, DISSOLVED (UG/L AS NI)	SELENIUM, DISSOLVED (UG/L AS SE)	SILVER, DISSOLVED (UG/L AS AG)	STRONTIUM, DISSOLVED (UG/L AS SR)	VANADIUM, DISSOLVED (UG/L AS V)	ZINC, DISSOLVED (UG/L AS ZN)
NOV										
02...	6	10	<.1	<10	<1	<1	<1	33	<6.0	<4
JAN										
18...	<4	8	.4	<10	1	<1	<1	45	<6.0	6
MAY										
03...	<4	10	.8	<10	5	<1	<1	29	<6.0	<3
JUL										
06...	5	29	.2	<10	<1	<1	<1	46	<6.0	17

04059500 FORD RIVER NEAR HYDE, MI
(National stream-quality accounting network station)

LOCATION.--Lat 45°45'20", long 87°12'05", in SW1/4 sec.19, T.39 N., R.23 W., Delta County, Hydrologic Unit 04030109, on right bank 40 ft downstream from bridge on County Road 533, 1.4 mi downstream from Tenmile Creek, and 1.5 mi north of Hyde.

DRAINAGE AREA.--450 mi^2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1954 to current year.

GAGE.--Water-stage recorder. Datum of gage is 681.77 ft National Geodetic Vertical Datum of 1929.

REMARKS.--Water-discharge records good except those for the winter period, which are fair.

AVERAGE DISCHARGE.--29 years, 388 ft^3/s, 11.71 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 7,590 ft^3/s May 7, 1960, gage height, 8.27 ft; minimum, 18 ft^3/s Aug. 30, 1976, gage height, 1.33 ft.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 3,320 ft^3/s Apr. 15, gage height, 5.93 ft; minimum, 44 ft^3/s Sept. 3-5, gage height, 1.56 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	485	445	500	450	190	220	413	937	1240	138	143	50
2	467	430	540	400	180	230	481	954	1260	133	128	47
3	460	419	580	360	180	240	561	926	1300	125	142	46
4	432	409	640	330	180	270	612	839	1330	136	138	44
5	399	394	700	310	180	400	632	766	1420	174	124	47
6	468	378	740	290	180	800	681	706	1360	213	115	74
7	626	357	600	270	180	1300	696	874	1290	212	99	66
8	652	340	450	260	180	1730	713	1110	1210	182	84	67
9	620	329	350	250	180	2100	778	1090	1130	153	72	69
10	819	367	280	240	180	1500	948	1060	959	132	86	72
11	1080	501	270	240	185	1300	1150	1030	777	119	197	71
12	1090	873	260	230	190	1200	1210	952	643	105	259	67
13	1050	1160	260	230	190	1100	1510	840	550	95	296	67
14	1020	1190	240	230	190	1000	2480	760	470	85	273	62
15	912	1000	220	220	195	900	3120	694	402	77	222	61
16	785	850	220	215	200	800	2830	652	366	72	179	78
17	675	750	220	210	200	750	2430	607	363	69	142	78
18	597	600	210	210	200	680	2010	549	356	64	119	116
19	548	800	210	210	205	620	1670	525	333	61	101	139
20	715	1000	210	210	210	600	1380	524	296	64	88	259
21	907	1200	210	210	210	560	1130	506	255	80	80	448
22	922	1000	210	210	210	530	1010	546	220	85	77	553
23	902	900	240	210	210	500	968	1070	193	76	70	604
24	860	800	457	210	210	480	959	1290	185	81	67	636
25	778	700	743	210	220	450	958	1440	241	78	64	633
26	680	620	914	210	220	430	966	1480	257	70	61	556
27	601	570	857	210	220	425	975	1500	215	64	59	441
28	567	530	750	205	220	402	980	1300	175	64	56	331
29	536	500	650	200	---	390	986	1210	157	71	55	254
30	501	480	580	200	---	408	974	1200	146	76	58	210
31	469	---	500	200	---	409	---	1240	---	115	54	---
TOTAL	21623	19892	13811	7640	5495	22724	36211	29177	19099	3269	3708	6246
MEAN	698	663	446	246	196	733	1207	941	637	105	120	208
MAX	1090	1200	914	450	220	2100	3120	1500	1420	213	296	636
MIN	399	329	210	200	180	220	413	506	146	61	54	44
CFSM	1.55	1.47	.99	.55	.44	1.63	2.68	2.09	1.42	.23	.27	.46
IN.	1.79	1.64	1.14	.63	.45	1.88	2.99	2.41	1.58	.27	.31	.52

CAL YR 1982 TOTAL 189269 MEAN 51[illegible] MAX 2750 MIN 73 CFSM 1.15 IN 15.65
WTR YR 1983 TOTAL 188895 MEAN [illegible] MAX 3120 MIN 44 CFSM 1.15 IN 15.62

04059500 FORD RIVER NEAR HYDE, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1956 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: December 1974 to September 1981.
WATER TEMPERATURES: July 1956 to September 1981.

INSTRUMENTATION.--Temperature recorder July 1956 to September 1975. Water-quality monitor October 1975 to September 1981.

REMARKS.--Quarterly samples were collected during the year as a cross-section sample in reach of stream 200 ft upstream to 200 ft downstream from gage. Complete ice cover during winter period. Daily record of specific conductance for water year 1975 is from once-daily observer samples.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum, 482 micromhos Dec. 2, 1976; minimum recorded, 131 micromhos May 22, 1976.
WATER TEMPERATURES: Maximum, 31.0°C July 31, 1975; minimum, 0.0°C on many days during winter periods.

WATER QUALITY DATA, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DATE	TIME	STREAM-FLOW, INSTANTANEOUS (CFS)	SPECIFIC CONDUCTANCE (UMHOS)	PH (STANDARD UNITS)	TEMPERATURE (DEG C)	TURBIDITY (NTU)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)	COLIFORM, FECAL, 0.7 UM-MF (COLS./100 ML)	STREPTOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)
NOV										
08...	1300	334	280	8.1	2.5	1.3	13.6	101	K5	12
JAN										
18...	1100	210	342	8.0	.0	1.0	13.7	95	<1	28
APR										
06...	1030	679	292	8.1	1.0	3.0	13.8	99	<1	K11
JUL										
15...	1030	77	315	8.5	27.5	<1.0	7.9	103	140	350

DATE	HARDNESS (MG/L AS CACO3)	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	PERCENT SODIUM	SODIUM ADSORPTION RATIO	POTASSIUM, DISSOLVED (MG/L AS K)	ALKALINITY LAB (MG/L AS CACO3)	CARBON DIOXIDE DISSOLVED (MG/L AS CO2)
NOV									
08...	147	34	15	1.2	2	.0	.4	143	2.2
JAN									
18...	179	42	18	1.3	2	.0	.5	155	3.0
APR									
06...	158	37	16	1.1	1	.0	.7	153	2.3
JUL									
15...	187	42	20	2.0	2	.1	.8	173	1.0

DATE	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, DISSOLVED (MG/L AS F)	SILICA, DISSOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	SOLIDS, DISSOLVED (TONS PER AC-FT)	SOLIDS, DISSOLVED (TONS PER DAY)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N)
NOV									
08...	11	2.4	<.1	6.8	172	157	.23	155	<.10
JAN									
18...	11	2.5	<.1	8.5	197	177	.27	112	.21
APR									
06...	9.2	2.2	<.1	6.6	185	165	.25	339	<.10
JUL									
15...	11	2.1	.1	6.8	233	189	.32	48.4	<.10

04059500 FORD RIVER NEAR HYDE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DATE	NITROGEN, AMMONIA DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS, DISSOLVED (MG/L AS P)	PHOSPHORUS, ORTHO, DISSOLVED (MG/L AS P)	PHOSPHATE, ORTHO, DISSOLVED (MG/L AS PO4)	SEDIMENT, SUSPENDED (MG/L)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
NOV 08...	<.010	1.30	.050	.050	.040	.12	0	.00	100
JAN 18...	.010	.20	.010	<.010	<.010	--	2	1.1	100
APR 06...	<.010	.20	.020	<.010	<.010	--	4	7.3	92
JUL 15...	<.010	.50	.030	.020	<.010	--	0	.00	100

DATE	TIME	ALUMINUM, DISSOLVED (UG/L AS AL)	ARSENIC DISSOLVED (UG/L AS AS)	BARIUM, DISSOLVED (UG/L AS BA)	BERYLLIUM, DISSOLVED (UG/L AS BE)	CADMIUM DISSOLVED (UG/L AS CD)	CHROMIUM, DISSOLVED (UG/L AS CR)	COBALT, DISSOLVED (UG/L AS CO)	COPPER, DISSOLVED (UG/L AS CU)	IRON, DISSOLVED (UG/L AS FE)	LEAD, DISSOLVED (UG/L AS PB)
NOV 08...	1300	<10	1	16	<1	<1	<1	<3	1	180	2
JAN 18...	1100	<10	1	22	<1	<1	1	<3	1	100	6
APR 06...	1030	<10	1	12	<1	<1	<1	<3	1	75	6
JUL 15...	1030	<10	1	51	<1	<1	<1	<3	1	26	5

DATE	LITHIUM DISSOLVED (UG/L AS LI)	MANGANESE, DISSOLVED (UG/L AS MN)	MERCURY DISSOLVED (UG/L AS HG)	MOLYBDENUM, DISSOLVED (UG/L AS MO)	NICKEL, DISSOLVED (UG/L AS NI)	SELENIUM, DISSOLVED (UG/L AS SE)	SILVER, DISSOLVED (UG/L AS AG)	STRONTIUM, DISSOLVED (UG/L AS SR)	VANADIUM, DISSOLVED (UG/L AS V)	ZINC, DISSOLVED (UG/L AS ZN)
NOV 08...	<4	10	<.1	<10	1	<1	<1	41	<6.0	<4
JAN 18...	<4	5	.1	<10	1	<1	<1	49	<6.0	<4
APR 06...	<4	8	<.1	<10	2	<1	<1	46	<6.0	<3
JUL 15...	7	26	<.1	<10	3	<1	<1	63	7.0	<3

04061000 BRULE RIVER NEAR FLORENCE, WI

LOCATION.--Lat 45°57'31", long 88°15'57", in SE1/4 SE1/4 sec.11, T.41 N., R.32 W., Michigan Meridian, Iron County, Hydrologic Unit 04030106, on left bank 40 ft upstream from highway bridge, 1.0 mi upstream from Paint River, 2.5 mi north of Florence, and 5.0 mi upstream from confluence with Michigamme River.

DRAINAGE AREA.--389 mi^2.

PERIOD OF RECORD.--January 1914 to February 1916, June 1944 to current year.

REVISED RECORDS.--WSP 1387: 1914-16. WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,200.55 ft National Geodetic Vertical Datum of 1929 (levels by Owen Ayres Associates). Prior to Aug. 29, 1944, nonrecording gage at bridge 40 ft downstream at same datum.

REMARKS.--Records good except those for the winter period, which are fair. Discharge includes some mine pumpage prior to August 1977. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--40 years (water years 1915, 1945-83), 362 ft^3/s, 12.64 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,700 ft^3/s July 2, 1953, gage height, 6.57 ft; maximum gage height, 8.27 ft Dec. 26, 1969, backwater from ice; minimum discharge, 118 ft^3/s Dec. 2, 1963 (discharge measurement); minimum gage height, 1.79 ft July 24, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,650 ft^3/s May 23, gage height, 3.95 ft; maximum gage height recorded, 7.18 ft Jan. 30, backwater from ice, but may have been higher during periods of no gage-height record Dec. 9-27, Jan. 5-8, 11-15, 18-29, Jan. 31 to Feb. 2, Feb. 5-9; minimum discharge, 267 ft^3/s Sept 3, 4, gage height, 2.13 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983 MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	369	403	440	410	320	330	374	648	896	393	427	307
2	344	392	457	400	320	335	389	627	808	388	334	287
3	359	388	410	390	320	345	393	659	787	447	381	273
4	363	385	401	390	320	370	386	592	1080	724	481	268
5	347	381	386	390	320	468	383	546	1150	703	419	296
6	429	374	383	390	320	495	405	515	994	537	362	361
7	535	356	370	380	315	731	407	682	817	454	323	344
8	536	354	360	380	310	900	407	953	714	412	298	309
9	476	352	350	370	310	930	450	836	699	385	294	288
10	561	354	350	370	310	752	464	685	670	373	433	289
11	569	400	340	365	310	696	462	595	604	360	657	319
12	521	614	330	355	320	630	476	555	561	343	535	301
13	478	703	325	350	320	586	560	574	533	332	431	291
14	442	586	325	350	320	562	855	636	512	324	379	281
15	417	580	325	350	330	534	1080	570	604	328	341	276
16	389	556	325	345	330	512	898	516	644	310	321	331
17	368	533	325	340	330	495	752	482	600	300	328	372
18	378	436	330	335	330	484	678	461	541	291	361	418
19	370	435	340	330	330	478	621	463	492	291	343	420
20	564	532	350	330	330	468	612	496	458	285	321	1040
21	772	615	360	330	330	462	657	520	434	329	303	1300
22	692	582	370	330	330	438	768	774	616	423	316	1020
23	459	521	390	325	330	434	849	1550	780	359	305	719
24	565	457	410	325	325	420	881	1560	600	320	290	582
25	548	406	440	320	325	400	898	1210	517	303	284	495
26	512	458	460	320	325	390	930	922	494	295	282	431
27	485	380	460	320	325	403	952	748	447	286	281	400
28	466	376	450	320	330	398	922	674	418	294	281	370
29	475	410	440	320	---	382	836	890	399	298	274	344
30	664	388	430	320	---	372	721	1010	392	295	307	332
31	433	---	410	320	---	369	---	1020	---	474	352	---
TOTAL	14829	13680	11842	10870	9035	15569	19466	22969	19261	11656	11044	13064
MEAN	478	456	382	351	323	502	649	741	642	376	356	435
MAX	772	703	460	410	330	930	1080	1560	1150	724	657	1300
MIN	344	352	325	320	310	330	374	461	392	285	274	268
CFSM	1.23	1.17	.98	.90	.83	1.29	1.67	1.91	1.65	.97	.92	1.12
IN.	1.42	1.31	1.13	1.04	.86	1.49	1.86	2.20	1.84	1.11	1.06	1.25

CAL YR 1982 TOTAL 150210 MEAN 412 MAX 1330 MIN 219 CFSM 1.06 IN 14.36
WTR YR 1983 TOTAL 173285 MEAN 475 MAX 1560 MIN 268 CFSM 1.22 IN 16.57

04061500 PAINT RIVER AT CRYSTAL FALLS, MI

LOCATION.--Lat 46°06'21", long 88°20'05", in SE1/4 sec.20, T.43 N., R.32 W., Iron County, Hydrologic Unit 04030106, on right bank 150 ft downstream from municipal powerplant at Crystal Falls, and 14.5 mi upstream from mouth.

DRAINAGE AREA.--597 mi^2.

PERIOD OF RECORD.--August 1944 to current year.

REVISED RECORDS.--WSP 1174: 1947-48(m). WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,306.1 ft National Geodetic Vertical Datum of 1929 (Wisconsin Electric Power Co. benchmark).

REMARKS.--Records good. Diurnal fluctuation caused by power-plant immediately upstream; since storage capacity is small, daily flows are not affected appreciably. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--39 years, 602 ft^3/s, 13.69 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 10,900 ft^3/s Apr. 25, 1960, gage height, 9.82 ft; minimum, 7.7 ft^3/s Sept. 17, 1950, gage height, 0.89 ft; minimum daily, 81 ft^3/s Nov. 1, 1947.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 3,580 ft^3/s May 24, gage height, 5.54 ft; minimum, 150 ft^3/s Sept. 2, gage height, 1.82 ft; minimum daily, 275 ft^3/s Aug. 28.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	654	786	686	634	441	460	541	1770	2240	585	396	295
2	617	767	702	611	437	466	540	1570	1930	566	389	304
3	562	724	772	561	411	468	553	1400	1710	575	404	279
4	567	701	775	540	400	483	551	1220	2420	947	478	281
5	667	689	761	549	454	548	551	1080	3070	1330	482	280
6	647	679	748	537	436	677	564	959	2700	1000	444	480
7	697	669	636	519	444	1080	587	1000	2130	802	403	593
8	714	663	467	500	440	1550	589	1130	1700	701	388	594
9	745	654	441	499	423	1780	634	1040	1480	651	336	537
10	1010	618	514	522	425	1460	683	881	1340	584	398	478
11	1020	660	510	515	421	1410	690	771	1130	565	613	544
12	1000	810	488	500	421	1460	691	735	951	527	687	517
13	1050	1210	531	486	422	1390	780	673	844	469	626	609
14	999	1090	534	492	423	1330	1390	725	775	459	532	532
15	751	824	538	478	432	1190	1970	741	813	441	476	476
16	700	889	517	475	433	1070	1890	737	893	421	413	518
17	760	871	483	476	437	1000	1690	684	936	389	397	531
18	700	841	471	476	435	919	1540	642	874	389	376	538
19	691	833	496	461	437	856	1350	610	794	368	379	519
20	823	955	505	445	439	770	1260	601	714	375	311	1250
21	1180	1260	494	452	448	787	1340	638	646	369	358	1780
22	1180	1390	488	443	450	730	1750	1070	1380	431	353	1570
23	1030	1280	486	445	446	701	2220	2940	3060	415	333	1300
24	1290	1110	496	447	436	649	2380	3460	2450	351	324	1060
25	1180	826	571	451	432	649	2420	3000	1540	392	315	895
26	1100	859	714	445	422	651	2500	2300	1050	356	330	763
27	1100	690	774	424	432	614	2560	1820	849	324	308	701
28	1080	627	760	423	449	584	2500	1580	738	345	275	642
29	980	766	736	435	---	563	2300	1770	678	359	357	563
30	813	709	641	428	---	556	2070	2090	585	352	311	548
31	729	---	639	426	---	542	---	2350	---	420	304	---
TOTAL	27036	25450	18374	15095	12126	27393	41084	41987	42420	16258	12496	19977
MEAN	872	848	593	487	433	884	1369	1354	1414	524	403	666
MAX	1290	1390	775	634	454	1780	2560	3460	3070	1330	687	1780
MIN	562	618	441	423	400	460	540	601	585	324	275	279
CFSM	1.46	1.42	.99	.82	.73	1.48	2.29	2.27	2.37	.88	.68	1.12
IN.	1.68	1.59	1.14	.94	.76	1.71	2.56	2.62	2.64	1.01	.78	1.24

CAL YR 1982 TOTAL 261940 MEAN 718 MAX 5220 MIN 214 CFSM 1.20 IN 16.32
WTR YR 1983 TOTAL 299696 MEAN 821 MAX 3460 MIN 275 CFSM 1.38 IN 18.67

04062000 PAINT RIVER NEAR ALPHA, MI

LOCATION.--Lat 46°00'40", long 88°[illegible]'30", in NW1/4 NW1/4 sec.25, T.42 N., R.32 W., Iron County, Hydrologic Unit 04030106, on right bank 0.6 mi downstream from Lower Paint Dam, 5.5 mi upstream from Brule River, and 6.0 mi southeast of Alpha.

DRAINAGE AREA.--631 mi^2.

PERIOD OF RECORD.--June 1952 to current year. Monthly discharge only for period October 1953 to September 1960, published in WSP 1727.

REVISED RECORDS.--WSP 1727: Drainage area.

GAGE.--Water-stage recorder. Altitude of gage is 1,260 ft from topographic map (nearest 10 ft).

REMARKS.--Records good. Flow completely regulated by powerplant and Lower Paint Dam, 0.6 mi upstream. Records not adjusted for diversion to Michigamme River by Paint River diversion canal. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--31 years, 175 ft^3/s.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 8,050 ft^3/s July 2, 1953, gage height, 10.50 ft; minimum daily, 62 ft^3/s Mar. 22, 1963.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 3,500 ft^3/s May 25, gage height, 8.05 ft; minimum daily, 84 ft^3/s July 29 to Aug. 2.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	94	226	102	98	95	98	92	642	2850	88	84	88
2	95	88	375	98	95	98	93	720	2760	88	84	88
3	93	88	624	98	95	98	91	439	2060	90	348	88
4	95	90	612	98	95	98	90	90	1660	91	370	88
5	95	90	296	98	95	98	91	90	2910	88	88	89
6	95	90	90	98	95	98	93	90	2850	88	88	89
7	96	90	92	98	95	98	91	95	2750	88	88	88
8	95	90	94	98	95	98	95	93	1420	88	88	88
9	98	90	94	98	95	98	92	93	95	88	88	88
10	98	92	94	98	95	98	93	92	205	86	90	91
11	97	93	94	98	95	98	92	90	493	86	88	91
12	97	95	94	98	95	98	93	90	485	86	88	91
13	97	93	94	98	95	98	94	90	479	87	88	91
14	99	94	94	98	95	98	94	90	311	88	88	90
15	98	94	94	98	95	98	94	90	91	86	88	89
16	99	95	94	98	95	97	95	90	90	86	86	90
17	98	95	94	98	95	97	93	90	90	88	86	90
18	97	96	94	96	95	96	92	90	90	86	86	92
19	98	97	94	96	95	98	93	90	90	85	86	90
20	103	99	96	96	95	98	92	90	90	86	86	95
21	102	128	96	96	95	98	93	90	91	89	86	92
22	106	236	96	95	96	98	96	196	543	87	86	90
23	102	205	96	95	96	98	96	1860	1500	88	88	89
24	102	139	96	95	96	98	145	2940	1610	86	88	90
25	105	101	96	95	98	98	165	3230	1100	87	88	88
26	105	100	98	95	98	98	406	3380	815	87	89	91
27	105	100	98	95	98	97	412	2480	316	86	88	87
28	105	100	97	95	98	95	209	1270	91	86	88	86
29	253	100	98	95	---	95	406	1270	91	84	88	86
30	376	100	98	95	---	93	661	2130	91	84	88	86
31	376	---	98	95	---	93	---	2850	---	84	88	---
TOTAL	3774	3294	4482	3000	2675	3017	4542	25040	28117	2695	3251	2679
MEAN	122	110	145	96.8	95.5	97.3	151	808	937	86.9	105	89.3
MAX	376	236	624	98	98	98	661	3380	2910	91	370	95
MIN	93	88	90	95	95	93	90	90	90	84	84	86

CAL YR 1982 TOTAL 72506 MEAN 199 MAX 2810 MIN 84
WTR YR 1983 TOTAL 86566 MEAN 237 MAX 3380 MIN 84

04062500 MICHIGAMME RIVER NEAR CRYSTAL FALLS, MI

LOCATION.--Lat 46°06'50", long 88°12'57", in NW1/4 sec.20, T.43 N., R.31 W., Iron County, Hydrologic Unit 04030107, on right bank 400 ft upstream from highway bridge, 5.0 mi downstream from Michigamme Reservoir, 6.0 mi east of Crystal Falls and 15 mi upstream from confluence with Brule River.

DRAINAGE AREA.--656 mi^2.

PERIOD OF RECORD.--August 1944 to current year.

REVISED RECORDS.--WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Altitude of gage is 1,300 ft from topographic map (nearest 10 ft).

REMARKS.--Records excellent. Flow regulated by powerplant and by Michigamme Reservoir, capacity, 119,950 acre-ft, 5 mi upstream. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--39 years, 711 ft^3/s.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 7,260 ft^3/s Apr. 28, 1960, gage height, 10.73 ft; minimum daily, 71 ft^3/s Nov. 26, 1950.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 3,380 ft^3/s June 2, 3, gage height, 7.65 ft; minimum daily, 148 ft^3/s Sept. 30.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	695	1340	1190	1050	1610	890	1150	677	2860	683	1120	220
2	697	1230	1180	1180	1600	644	1150	929	3100	681	1110	385
3	965	1130	1200	1180	1590	484	1140	1120	3090	652	1110	548
4	1190	1130	1190	1180	1580	490	1150	1150	2860	630	889	554
5	1190	1040	1190	1180	1580	488	1150	1160	2870	623	661	537
6	1190	697	1190	1180	855	366	1150	1160	2870	618	658	548
7	1190	695	1190	1190	745	171	1140	1190	2870	618	658	546
8	1100	911	1180	1190	1240	188	1140	1200	2400	615	927	543
9	629	1150	1180	1190	1340	195	1150	1190	1900	615	1210	543
10	640	1180	1170	1180	1330	193	894	1180	1560	613	1210	333
11	980	1200	1190	1190	1330	197	569	1170	1230	614	620	185
12	1180	1230	1200	1200	1320	196	572	1170	1350	610	200	186
13	1160	1230	1190	1200	1310	199	592	1170	1490	610	200	187
14	1160	1220	1190	1200	1300	191	426	1180	1490	609	200	188
15	1160	1210	1190	1190	1330	180	273	1170	1490	607	435	190
16	1150	1210	1180	1210	1310	181	239	1160	1330	606	586	199
17	1150	1200	1150	1220	1320	181	211	1160	1190	608	584	196
18	1170	1200	1200	1210	1330	182	195	1160	1180	639	583	194
19	1190	1200	1210	1210	1310	183	188	1150	920	671	582	189
20	1210	1020	1210	1220	1310	182	188	1150	691	784	579	241
21	1220	1090	1200	1280	1320	389	195	1150	689	891	579	210
22	1220	1210	1200	1390	1260	568	206	1220	1140	1030	873	186
23	1210	1200	1200	1400	1190	592	211	1850	1700	1170	1180	169
24	1210	1200	1200	1390	1100	876	210	2290	1420	1160	1160	159
25	1200	1200	1220	1390	859	1170	201	2510	1190	1160	1180	156
26	1200	1190	643	1390	882	1170	192	2480	1190	1150	1200	154
27	1200	1190	444	1400	908	1160	198	1990	1180	1150	1180	151
28	1200	1190	608	1410	890	1170	197	1760	885	1140	1160	151
29	1300	1190	349	1490	---	1170	494	2080	686	1130	1070	150
30	1390	1190	174	1600	---	1160	681	2590	685	1130	862	148
31	1360	---	576	1600	---	1160	---	2890	---	1130	325	---
TOTAL	34706	34273	32584	39490	35049	16566	17452	45406	49506	24947	24891	8346
MEAN	1120	1142	1051	1274	1252	534	582	1465	1650	805	803	278
MAX	1390	1340	1220	1600	1610	1170	1150	2890	3100	1170	1210	554
MIN	629	695	174	1050	745	171	188	677	685	606	200	148

CAL YR 1982 TOTAL 302859 MEAN 830 MAX 4420 MIN 134
WTR YR 1983 TOTAL 363216 MEAN 995 MAX 3100 MIN 148

04063000 MENOMINEE RIVER NEAR FLORENCE, WI

LOCATION.--Lat 45°57'04", long 88°11'13", in NE1/4 sec.16, T.41 N., R.31 W., Michigan Meridian, Iron County, Hydrologic Unit 04030108, on left bank 0.5 mi downstream from confluence of Brule and Michigamme Rivers, 3.5 mi northeast of Florence, and at mile 117.

DRAINAGE AREA.--1,780 mi^2.

PERIOD OF RECORD.--January 1914 to current year. Published as "at Twin Falls near Iron Mountain, MI" 1914-57. Records published for both sites July 1950 to September 1957.

REVISED RECORDS.--WSP 1707: 1953(M). WSP 1911: Drainage area of former site.

GAGE.--Water-stage recorder. Datum of gage is 1,119.23 ft National Geodetic Vertical Datum of 1929 (levels by Owen Ayres Associates). Prior to July 1950, headwater and tailwater gages and generation data entered hourly in daily log sheets by company employees at the Twin Falls Powerplant of Wisconsin Electric Power Co., 10.4 mi downstream.

REMARKS.--Records excellent. Prior to July 1950, discharge determined from powerplant records computed on basis of load-discharge rating of hydroelectric units and rating for tailwater gage during periods of spill. Rating developed by Geological Survey. Flow regulated by powerplants, Michigamme Reservoir capacity, 119,950 acre-ft and Peavy Pond, capacity, 33,860 acre-ft, on Michigamme River, and by many smaller reservoirs above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--69 years, 1,817 ft^3/s.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 19,500 ft^3/s Apr. 26, 1960, gage height, 14.15 ft; minimum 38 ft^3/s Aug. 21, 1962, Sept. 26, 1975; minimum gage height, 1.18 ft Aug. 21, 1962, Nov. 4, 1965; minimum daily discharge, 57 ft^3/s Sept. 26, 1975.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 8,100 ft^3/s June 5, 6, gage height, 8.65 ft; minimum, 223 ft^3/s Sept. 18, gage height, 1.88 ft; minimum daily, 1,020 ft^3/s Sept. 10.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2010	2290	2220	2140	2360	1820	2270	3480	6800	1630	1680	1190
2	2080	2260	3040	2250	2350	1860	2330	3690	6920	1460	1760	1260
3	2040	2410	3290	2210	2330	2020	2330	3260	5660	1830	1810	1370
4	2420	2260	3200	2200	2250	2260	2010	2960	6030	2130	2170	1270
5	2290	2240	2970	2250	2390	2130	2420	2810	8090	2610	1780	1260
6	2410	2010	2670	2200	1310	1790	2220	2830	7950	2600	1800	1480
7	2350	2230	2380	2250	2200	2200	1880	2990	6860	2710	1810	1380
8	2700	2460	2170	2100	2340	3460	2030	3320	4580	2560	1810	1330
9	2250	2410	1730	2200	2270	3410	2130	3330	3340	1530	1740	1300
10	2460	2210	1790	2360	2130	2820	2210	3010	3350	1640	1930	1020
11	2710	2480	1910	2220	2320	2530	2350	2780	3640	1790	2250	1120
12	2970	2810	1670	2080	2340	2880	1820	2300	3510	1640	1900	1350
13	3050	3270	2120	2270	2370	2820	1320	2560	3420	1170	1380	1450
14	3000	3180	1870	2230	2230	2850	2090	2390	3250	1480	1280	1390
15	2950	2870	2190	2310	2080	2780	3370	2440	3040	1830	1500	1170
16	2930	2590	2210	2280	2470	2380	3340	2560	3310	1590	1610	1310
17	2830	2800	2300	2210	2300	2400	3040	2650	2960	1510	1830	1260
18	3110	2620	2330	2210	2320	2340	2880	2480	2570	1690	1450	1220
19	2970	2660	2070	2250	2210	2550	2510	2250	2470	1670	1560	1390
20	3190	2680	2150	1990	2240	2440	2260	2400	2090	1670	1530	2830
21	3240	3280	2090	2200	2280	2530	1680	2450	2240	1550	1530	3810
22	3210	3370	2060	2490	2280	2380	1850	2940	2980	1830	1670	3230
23	3130	3040	2220	2260	2070	2240	2380	6030	5140	1980	1630	2580
24	2980	2920	2080	2210	2450	2070	2400	7200	4730	1630	1500	2460
25	3030	2940	2170	2340	2220	2300	2900	7040	4200	2000	1640	1460
26	3050	3130	2000	2350	2240	2260	3160	7100	3640	1950	1540	1400
27	3260	2850	1880	2450	2230	2240	3720	5730	2760	1970	1770	1630
28	3130	2360	1840	2400	2230	2290	3490	4330	1510	2000	1810	1530
29	3250	2150	1970	2260	---	2300	3780	4480	1810	2020	1790	1630
30	3120	2160	1790	2360	---	2310	3710	5530	1620	1830	1490	1330
31	2680	---	2240	2300	---	2420	---	6740	---	2050	1500	---
TOTAL	86800	78940	68620	69830	62810	75080	75880	116060	120470	57550	52450	48410
MEAN	2800	2631	2214	2253	2243	2422	2529	3744	4016	1856	1692	1614
MAX	3260	3370	3290	2490	2470	3460	3780	7200	8090	2710	2250	3810
MIN	2010	2010	1670	1990	1310	1790	1320	2250	1510	1170	1280	1020

CAL YR 1982 TOTAL 790519 MEAN 2166 MAX 8850 MIN 494
WTR YR 1983 TOTAL 912900 MEAN 2501 MAX 8090 MIN 1020

04065393 EAST BRANCH STURGEON RIVER BELOW SKUNK CREEK, NEAR FELCH, MI

LOCATION.--Lat 46°01'34", long 87°49'56", in NW1/4 NE1/4 sec.20, T.42 N., R.28 W., Dickinson County, Hydrologic Unit 04030108, on right bank 50 ft downstream from Skunk Creek, and 2.2 mi north of Felch.

DRAINAGE AREA.--61.8 mi^2.

PERIOD OF RECORD.--Occasional low-flow measurements, water years 1972, 1973. October 1973 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,067.53 ft National Geodetic Vertical Datum of 1929. Prior to Dec. 20, 1973, nonrecording gage, and Dec. 20, 1973 to Sept. 30, 1980, water-stage recorder at present site at datum 2.00 ft higher.

REMARKS.--Records good except those for the winter period, which are fair. Since June 1975, occasional regulation during low flows by Gene Lake Reservoir, usable capacity, 3,990 acre-ft, 3 mi upstream. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--10 years, 55.1 ft^3/s, 12.11 in/yr, adjusted for initial storage.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 628 ft^3/s Apr. 26, 1979, gage height, 6.28 ft, present datum; minimum, 3.4 ft^3/s Sept. 7, 8, 9, 13, 1976, July 7, 1980.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 440 ft^3/s Apr. 15, gage height, 5.84 ft; minimum, 6.2 ft^3/s Sept. 3.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	67	53	52	64	29	32	47	89	213	22	14	7.3
2	61	51	57	58	30	33	53	83	172	22	14	6.8
3	62	54	67	52	30	34	59	80	148	22	15	6.5
4	60	53	70	48	30	39	60	76	177	36	17	6.7
5	56	52	68	45	30	47	60	70	247	38	15	8.0
6	59	50	75	43	29	60	66	65	244	31	13	9.7
7	71	47	66	42	27	99	68	86	185	27	12	10
8	74	46	60	41	26	160	72	133	145	24	12	8.9
9	71	45	55	41	26	213	81	145	125	24	10	8.4
10	98	46	50	41	26	207	92	130	107	22	20	9.7
11	121	57	47	41	26	178	109	111	92	21	41	11
12	122	94	45	40	26	159	121	94	79	20	38	9.3
13	110	131	41	40	27	134	149	84	69	18	32	8.5
14	100	132	38	40	28	118	265	86	61	17	28	9.0
15	84	119	37	40	30	102	418	81	55	16	25	8.2
16	74	102	36	39	31	91	364	72	65	15	22	18
17	67	86	35	37	32	83	266	65	64	16	20	21
18	63	74	36	35	32	79	187	59	56	14	19	25
19	61	73	37	33	32	74	146	57	50	13	17	23
20	78	96	38	31	32	70	128	58	44	13	15	79
21	102	110	38	30	32	65	117	58	39	16	14	103
22	107	106	38	30	33	62	117	72	39	19	14	97
23	98	94	42	30	34	58	115	181	38	16	13	86
24	88	78	48	30	33	55	109	290	34	15	11	72
25	78	72	58	30	33	52	105	260	31	13	11	61
26	71	64	68	29	32	51	107	210	29	12	11	54
27	65	58	78	29	31	49	108	150	27	11	10	48
28	63	55	86	28	31	47	107	116	23	11	9.1	42
29	61	53	87	28	---	47	104	117	20	11	8.5	37
30	65	53	82	28	---	45	98	160	20	10	8.1	33
31	57	---	72	28	---	45	---	212	---	13	8.0	---
TOTAL	2414	2204	1707	1171	838	2588	3898	3550	2698	578	516.7	927.0
MEAN	77.9	73.5	55.1	37.8	29.9	83.5	130	115	89.9	18.6	16.7	30.9
MAX	122	132	37	64	34	213	418	290	247	38	41	103
MIN	56	45	35	28	26	32	47	57	20	10	8.0	6.5
CFSM	1.26	1.19	.89	.61	.48	1.35	2.10	1.86	1.46	.30	.27	.50
IN.	1.45	1.33	1.03	.70	.50	1.56	2.35	2.14	1.62	.35	.31	.56

CAL YR 1982 TOTAL 21215.6 MEAN 58.1 MAX 272 MIN 6.6 CFSM .94 IN 12.77
WTR YR 1983 TOTAL 23089.7 MEAN 63.3 MAX 418 MIN 6.5 CFSM 1.02 IN 13.90

04065397 EAST BRANCH STURGEON RIVER AT HARDWOOD, MI

LOCATION.--Lat 45°57'55", long 87°41'53", in SW1/4 NW1/4 sec.9, T.41 N., R.27 W., Dickinson County, Hydrologic Unit 04030108, on right bank 10 ft downstream from bridge or county highway, at Hardwood, 350 ft upstream from Schultz Creek, and 9 mi upstream from confluence with West Branch.

DRAINAGE AREA.--90.8 mi^2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--Occasional low-flow measurements, water years 1972-77. October 1977 to September 1983 (discontinued).

GAGE.--Water-stage recorder. Altitude of gage is 1,030 ft from topographic map (nearest 10 ft). Sept. 20, 1972 to Sept. 30, 1977, non-recording gage at site 1 mi upstream at different datum. Oct. 1-20, 1977, non-recording gage at present site and datum.

REMARKS.--Water-discharge records good. Occasional regulation during low flows by Gene lake Reservoir in headwaters (station 04065393) and Hardwood Reservoir 1.2 mi upstream, combined usable capacity, 11,180 acre-ft.

AVERAGE DISCHARGE.--6 years, 85.4 ft^3/s, 12.77 in/yr, adjusted for initial storage.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 869 ft^3/s Apr. 27, 1979, gage height, 8.44 ft; minimum, 1.0 ft^3/s Aug. 14, 15, 1983, gage height, 2.50 ft, result of unusual regulation at Hardwood Reservoir; minimum daily, 1.2 ft^3/s Aug. 14, 1983.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 482 ft^3/s Apr. 15, gage height, 6.91 ft; minimum, 1.0 ft^3/s Aug. 14, 15, gage height, 2.50 ft, result of unusual regulation at Hardwood Reservoir; minimum daily, 1.2 ft^3/s Aug. 14.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	108	88	85	106	43	51	77	165	245	40	35	11
2	98	83	89	95	44	52	83	159	258	39	35	11
3	95	79	99	83	48	54	87	146	257	39	30	11
4	88	78	101	74	46	58	93	136	283	44	15	11
5	84	78	110	68	45	68	96	124	275	42	15	11
6	92	74	129	66	45	88	102	118	279	42	15	13
7	97	72	123	66	45	132	110	139	277	41	15	13
8	98	71	109	63	43	189	114	160	258	41	15	12
9	101	68	99	60	42	266	124	167	238	40	15	12
10	158	71	93	64	41	271	146	182	206	39	13	12
11	171	81	80	64	41	271	162	187	176	39	5.4	12
12	179	140	68	61	40	278	181	182	153	39	3.2	12
13	187	168	60	61	41	264	225	167	131	39	1.6	12
14	186	183	55	63	44	242	329	153	112	39	1.2	12
15	170	188	52	60	48	207	452	137	99	39	4.6	12
16	150	189	51	58	48	181	476	126	96	39	11	14
17	129	171	49	55	48	164	446	116	91	39	11	14
18	117	155	48	52	47	149	386	106	86	39	11	15
19	107	149	51	49	48	140	323	102	79	39	11	14
20	130	159	52	46	48	122	267	98	71	39	11	29
21	133	168	51	45	49	118	232	98	64	39	11	40
22	137	169	51	43	50	105	212	114	59	39	11	78
23	142	171	55	44	51	97	200	187	55	39	11	103
24	144	155	64	45	50	91	195	228	49	38	11	111
25	139	129	95	45	49	86	191	290	46	38	11	111
26	128	119	112	44	48	85	187	310	45	36	11	100
27	116	98	117	43	48	82	189	290	44	34	11	88
28	111	88	139	42	49	78	183	253	41	34	11	77
29	103	91	138	42	---	76	183	240	39	34	11	64
30	96	86	127	45	---	74	175	233	39	34	11	59
31	91	---	115	43	---	74	---	234	---	37	11	---
TOTAL	3885	3619	2667	1795	1289	4213	6226	5347	4151	1199	395.0	1094
MEAN	125	121	86.0	57.9	46.0	136	208	172	138	38.7	12.7	36.5
MAX	187	189	139	106	51	278	476	310	283	44	35	111
MIN	84	68	48	42	40	51	77	98	39	34	1.2	11
CFSM	1.38	1.33	.95	.64	.51	1.50	2.29	1.89	1.52	.43	.14	.40
IN.	1.59	1.48	1.09	.74	.53	1.73	2.55	2.19	1.70	.49	.16	.45

CAL. YR 1982 TOTAL 35150.0 MEAN 96.3 MAX 427 MIN 11 CFSM 1.06 IN 14.40
WTR YR 1983 TOTAL 35880.0 MEAN 98.3 MAX 476 MIN 1.2 CFSM 1.08 IN 14.70

04065397 EAST BRANCH STURGEON RIVER AT HARDWOOD, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: December 1977 to September 1983 (discontinued).

INSTRUMENTATION.--Water-quality monitor since December 1977.

REMARKS.--Interruptions in the record were due to malfunctions of the instrument. Intermittent ice cover during winter period.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum recorded (water years 1978-81, 1983), 28.0°C July 11, 12, 1979; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum, 27.0°C Aug. 6, 7; minimum, 0.0°C on many days during winter period.

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1				---	---	---	2.5	2.5	2.5	1.5	1.0	1.5
2				7.5	---	---	2.5	2.5	2.5	1.5	.5	1.0
3				7.0	6.5	7.0	3.0	2.0	2.5	1.5	.5	1.0
4				6.5	6.5	6.5	2.5	2.5	2.5	1.0	.5	1.0
5				6.5	5.0	6.0	2.5	2.0	2.0	1.5	.5	1.0
6				5.5	4.5	5.0	2.5	2.0	2.0	1.0	.0	.5
7				5.5	4.5	5.0	2.5	2.0	2.0	1.0	.5	1.0
8				5.0	4.5	4.5	2.0	2.0	2.0	1.0	.0	.5
9				4.5	4.0	4.5	2.0	2.0	2.0	1.5	.5	1.0
10				4.0	4.0	4.0	2.5	2.0	2.0	1.0	.5	1.0
11				4.0	4.0	4.0	2.0	2.0	2.0	1.0	.5	.5
12				4.0	3.5	3.5	2.5	2.0	2.0	1.0	.5	.5
13				3.0	2.5	3.0	2.5	2.0	2.0	1.5	.5	1.0
14				2.5	2.0	2.5	2.0	2.0	2.0	1.5	.5	1.0
15				3.0	2.5	2.5	2.0	1.5	2.0	1.5	.5	.5
16				3.0	2.5	2.5	2.0	1.5	2.0	1.5	.5	1.0
17				3.0	2.5	2.5	2.0	1.5	2.0	1.0	.5	.5
18				2.5	2.5	2.5	2.0	2.0	2.0	1.5	.5	.5
19				2.5	2.0	2.5	2.0	2.0	2.0	1.5	.0	.5
20				2.5	2.0	2.0	2.0	2.0	2.0	2.0	.5	1.0
21				2.5	2.0	2.5	2.0	2.0	2.0	2.0	.5	1.0
22				2.5	2.0	2.5	2.0	2.0	2.0	2.0	.5	1.0
23				2.5	2.0	2.5	2.0	2.0	2.0	2.0	1.0	1.5
24				2.5	2.0	2.0	2.0	2.0	2.0	2.0	1.0	1.5
25				2.5	2.0	2.5	2.0	2.0	2.0	1.5	.0	.5
26				2.5	2.0	2.0	2.0	2.0	2.0	1.5	.0	.5
27				2.5	2.0	2.0	2.0	2.0	2.0	1.0	.0	.5
28				2.5	2.0	2.0	2.0	2.0	2.0	1.5	.5	1.0
29				2.5	2.0	2.5	2.0	1.5	2.0	1.5	1.0	1.5
30				2.5	2.5	2.5	2.0	1.5	1.5	2.0	1.0	1.0
31				---	---	---	1.5	1.5	1.5	1.5	1.0	1.0
MONTH							3.0	1.5	2.0	2.0	.0	1.0

04065397 EAST BRANCH STURGEON RIVER AT HARDWOOD, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	1.0	1.0	1.0	2.5	2.0	2.0	3.0	1.0	1.5	11.0	8.5	9.5
2	1.5	.0	1.0	3.0	2.0	2.0	2.0	1.0	1.5	10.5	9.0	9.5
3	1.0	.0	.5	2.5	2.0	2.0	1.5	1.0	1.5	11.0	9.0	10.0
4	1.5	.0	.5	---	---	---	1.5	1.0	1.5	10.5	9.0	9.5
5	1.5	.0	.5	---	---	---	2.5	1.0	1.5	11.0	9.0	9.5
6	1.5	.0	1.0	---	---	---	1.5	1.0	1.5	10.5	9.0	9.5
7	1.5	.0	.5	---	---	---	2.0	1.0	1.5	9.5	9.0	9.5
8	2.0	.0	.5	---	---	---	2.5	1.0	1.5	10.5	8.5	9.5
9	2.0	.5	1.0	---	---	---	2.0	.5	1.5	12.5	9.0	10.0
10	2.0	.5	1.0	---	---	---	2.0	1.5	1.5	12.0	9.0	10.0
11	2.0	.5	1.5	1.0	.5	.5	2.0	1.5	2.0	12.0	9.5	10.5
12	2.0	1.5	1.5	1.0	.0	.5	2.0	1.5	2.0	13.0	11.0	12.0
13	2.0	1.5	1.5	1.0	.0	.5	1.5	1.5	1.5	12.5	12.0	12.5
14	2.0	1.5	1.5	.5	.5	.5	1.5	1.5	1.5	13.0	11.5	12.5
15	2.0	2.0	2.0	.5	.5	.5	1.5	1.5	1.5	13.0	11.0	12.0
16	2.0	2.0	2.0	1.0	.5	.5	1.5	1.5	1.5	13.0	11.5	12.0
17	3.0	1.5	2.0	1.0	.5	.5	2.0	1.0	1.5	14.0	11.0	12.0
18	2.5	1.5	2.0	1.0	.5	.5	1.5	1.0	1.5	13.5	11.0	12.0
19	2.0	2.0	2.0	1.0	.0	.5	2.0	1.5	1.5	12.5	11.5	12.0
20	---	---	---	1.5	.5	.5	2.0	1.5	2.0	13.0	11.5	12.5
21	---	---	---	1.5	.5	.5	3.0	2.0	2.0	13.5	12.0	12.5
22	---	---	---	2.0	.5	1.0	3.5	2.0	2.5	13.0	12.5	12.5
23	2.0	1.0	1.5	2.0	.5	1.0	4.0	2.5	3.0	14.0	12.5	13.0
24	2.0	1.5	2.0	2.5	.5	1.0	5.0	3.0	4.0	14.0	13.0	13.5
25	3.0	1.0	2.0	2.5	.5	1.0	6.0	4.0	4.5	13.5	13.0	13.0
26	3.5	1.0	2.0	2.0	.5	1.0	6.5	4.5	5.5	14.0	12.5	13.0
27	3.0	2.0	2.5	1.5	1.0	1.0	6.0	4.5	5.0	15.0	12.0	13.0
28	2.5	2.0	2.0	2.5	.5	1.0	8.0	5.0	6.5	15.5	12.0	13.5
29	---	---	---	3.0	.5	1.0	8.5	5.5	7.0	13.0	12.5	13.0
30	---	---	---	2.0	1.0	1.5	9.0	8.0	8.5	12.5	12.0	12.0
31	---	---	---	1.5	1.0	1.5	---	---	---	12.5	12.0	12.0
MONTH							9.0	.5	2.5	15.5	8.5	11.5

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	12.5	11.5	12.0	20.5	17.0	18.5	25.0	21.0	22.5	24.5	17.0	20.0
2	13.5	12.0	12.5	22.0	17.0	19.0	25.5	21.0	23.0	25.5	18.0	21.0
3	15.5	12.0	13.5	20.5	17.0	19.0	24.5	22.0	23.0	25.5	19.5	21.5
4	15.5	13.5	14.5	20.5	17.0	18.5	26.0	21.0	22.5	23.0	20.0	21.5
5	15.5	13.5	14.5	21.5	17.0	19.0	26.5	20.0	22.5	21.0	20.0	20.5
6	14.5	12.5	13.5	22.5	17.0	19.0	27.0	20.5	23.0	21.0	17.5	19.5
7	15.5	13.5	14.5	23.5	18.0	20.0	27.0	19.0	22.5	23.5	16.0	19.0
8	15.5	14.0	15.0	22.0	19.0	20.0	26.5	21.0	22.5	24.0	16.5	19.5
9	15.5	13.5	14.5	23.0	18.5	20.0	24.5	18.5	21.0	24.0	19.0	21.0
10	18.0	15.0	16.0	22.5	18.0	20.0	20.0	17.5	18.5	21.5	19.0	20.0
11	16.5	15.0	15.5	24.0	19.0	20.5	21.5	16.0	18.0	22.5	16.5	18.5
12	18.5	15.5	17.0	23.5	18.5	20.0	22.0	15.5	18.5	19.0	17.0	17.5
13	19.5	17.0	18.0	24.0	18.5	20.5	23.0	17.0	20.0	19.5	14.5	16.5
14	20.5	17.0	18.5	24.0	19.0	21.0	25.5	20.5	22.5	20.0	14.0	16.5
15	19.0	16.0	17.5	23.5	19.0	20.5	26.0	21.0	23.0	17.0	14.0	15.5
16	17.0	16.5	16.5	24.0	19.5	21.0	26.5	19.0	22.0	15.5	15.0	15.5
17	17.0	15.5	16.5	24.0	19.5	21.0	23.0	20.0	21.0	18.0	14.0	15.5
18	20.0	16.0	17.5	24.0	19.5	21.0	25.0	18.0	21.0	18.0	15.0	16.0
19	20.0	15.5	17.5	24.0	20.0	21.5	24.5	20.0	21.5	15.5	13.0	14.5
20	20.0	16.0	18.0	24.5	20.0	21.5	25.0	17.5	20.5	14.0	12.0	13.0
21	20.5	16.5	18.0	21.5	20.5	21.0	20.0	17.5	19.0	14.5	11.5	12.5
22	20.5	16.5	18.0	24.5	20.0	21.5	24.0	18.0	20.5	14.0	12.5	13.0
23	20.5	16.5	18.0	24.5	20.5	21.5	23.5	16.5	19.5	14.0	12.5	13.0
24	19.5	16.5	17.5	24.0	20.5	22.0	24.5	17.0	20.0	13.5	12.0	12.5
25	18.5	16.0	17.0	25.5	20.5	22.5	23.5	18.5	20.5	13.5	12.5	12.5
26	20.5	16.5	17.5	25.5	20.5	22.5	24.5	19.0	21.0	13.5	12.0	12.5
27	19.5	16.0	17.0	25.0	20.5	22.5	25.5	19.0	21.5	14.0	13.0	13.5
28	20.5	15.5	17.0	24.5	22.0	23.0	24.5	18.0	21.0	15.5	13.5	14.0
29	20.0	15.5	17.5	26.0	22.0	23.5	25.0	18.0	21.0	15.5	13.5	14.0
30	20.5	16.5	18.0	26.0	21.0	23.0	24.0	19.5	21.0	16.5	14.5	15.0
31	---	---	---	25.0	21.5	22.5	24.5	17.5	20.5	---	---	---
MONTH	20.5	11.5	16.5	26.0	17.0	21.0	27.0	15.5	21.0	25.5	11.5	16.5

04096400 ST. JOSEPH RIVER NEAR BURLINGTON, MI

LOCATION.--Lat 42°06'10", long 85°02'25", in SW1/4 SW1/4 sec.20, T.4 S., R.6 W., Calhoun County, Hydrologic Unit 04050001, on right bank 10 ft upstream from bridge on 13 Mile Rd., 2.0 mi east of Burlington, 4.0 mi downstream from Tekonsha Creek, and at mile 164.

DRAINAGE AREA.--201 mi^2.

PERIOD OF RECORD.--October 1962 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 920 ft from topographic map (nearest 10 ft).

REMARKS.--Records good. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--21 years, 173 ft^3/s, 11.69 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,340 ft^3/s Mar. 21, 1982, gage height, 5.78 ft; minimum, 8.0 ft^3/s Aug. 9, 10, 11, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 700 ft^3/s May 8, gage height, 4.80 ft; minimum, 46 ft^3/s Sept. 14, 15, 16, gage height, 1.62 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	106	73	299	347	147	182	306	346	290	237	120	68
2	97	131	287	327	155	174	322	498	277	236	121	64
3	90	192	297	302	193	167	375	568	271	210	110	60
4	84	212	323	279	192	163	359	531	272	186	107	57
5	80	222	354	261	192	161	344	539	263	167	103	54
6	77	227	403	237	189	164	356	564	265	153	100	56
7	75	222	387	227	194	190	392	603	262	137	96	62
8	74	197	371	216	177	223	400	679	251	127	88	57
9	73	181	362	206	164	238	405	663	240	120	82	56
10	74	179	351	207	156	223	500	606	225	120	79	53
11	72	184	332	215	151	204	505	559	210	113	120	51
12	72	225	308	212	148	196	478	512	194	107	135	50
13	72	241	282	202	152	189	468	470	180	100	133	48
14	70	236	276	195	160	181	523	431	169	95	113	47
15	69	231	253	188	141	171	553	399	159	90	100	46
16	68	221	270	178	145	161	510	364	153	85	93	48
17	67	209	269	160	171	153	488	334	152	84	89	50
18	66	195	260	142	184	157	470	309	143	92	88	50
19	65	183	258	150	195	178	455	298	135	95	83	53
20	69	230	257	163	209	185	441	302	130	88	79	54
21	68	268	247	155	217	184	421	287	125	85	75	62
22	68	274	236	150	227	184	398	329	119	168	77	69
23	68	288	233	149	237	182	375	388	114	187	76	72
24	67	317	248	152	238	178	352	352	109	172	73	67
25	65	312	299	151	229	171	329	342	105	144	69	63
26	64	307	329	152	214	167	302	343	102	123	67	61
27	64	299	319	140	202	188	270	332	105	110	67	60
28	64	298	354	130	192	315	259	321	175	105	66	60
29	63	319	377	127	---	340	264	316	223	105	65	58
30	64	314	366	138	---	323	296	310	232	104	68	54
31	65	---	348	146	---	312	---	301	---	117	76	---
TOTAL	2240	6987	9555	6004	5171	6204	11916	13196	5650	4062	2818	1710
MEAN	72.3	233	308	194	185	200	397	426	188	131	90.9	57.0
MAX	106	319	403	347	238	340	553	679	290	237	135	72
MIN	63	73	233	127	141	153	259	287	102	84	65	46
CFSM	.36	1.16	1.53	.97	.92	1.00	1.98	2.12	.94	.65	.45	.28
IN.	.41	1.29	1.77	1.11	.96	1.15	2.21	2.44	1.05	.75	.52	.32

CAL YR 1982 TOTAL 93965 MEAN 257 MAX 1330 MIN 57 CFSM 1.28 IN 17.39
WTR YR 1983 TOTAL 75513 MEAN 207 MAX 679 MIN 46 CFSM 1.03 IN 13.98

04096515 HOG CREEK NEAR ALLEN, MI

LOCATION.--Lat 41°56'55", long 84°49'40", in NE1/4 SE1/4 sec.13, T.6 S., R.5 W., Branch County, Hydrologic Unit 04050001, on left bank 12 ft downstream from bridge on U.S. Highway 12, 1.0 mi downstream from Little Hog Creek, and 3.1 mi west of Allen.

DRAINAGE AREA.--48.7 mi^2.

PERIOD OF RECORD.--October 1969 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 1,010 ft from topographic map. Prior to May 23, 1970, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--14 years, 43.6 ft^3/s, 12.16 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 524 ft^3/s Mar. 17, 1982, gage height, 5.63 ft; maximum gage height, 5.78 ft June 28, 1978; minimum discharge, 1.2 ft^3/s Aug. 20, 21, 1971; minimum gage height, 1.33 ft Sept. 30, Oct. 1, 1979.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 270 ft^3/s May 3, gage height, 4.58 ft; minimum, 6.3 ft^3/s Sept. 15, gage height, 1.46 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	9.6	15	65	78	27	39	79	94	64	46	61	13
2	9.1	50	62	71	32	37	78	162	59	41	59	12
3	8.8	67	65	63	54	36	102	250	56	37	50	11
4	8.4	55	80	56	48	36	120	262	56	33	46	11
5	8.1	39	91	51	43	36	117	230	52	30	42	9.9
6	7.6	32	107	47	39	39	110	196	59	25	37	10
7	8.4	27	111	46	35	48	110	171	68	22	32	11
8	8.4	25	99	44	32	53	115	174	59	20	28	10
9	8.1	24	85	41	31	57	119	169	50	19	24	9.1
10	8.6	25	76	44	29	53	132	149	45	18	21	8.4
11	8.4	25	69	49	28	47	143	126	40	17	36	7.9
12	8.1	38	59	47	28	42	139	107	37	16	46	7.4
13	7.9	49	49	42	28	39	130	92	34	14	36	7.2
14	7.6	41	43	39	27	36	137	82	32	13	30	6.7
15	7.4	34	44	37	26	34	159	75	30	13	26	6.5
16	6.9	30	59	33	28	32	162	68	30	12	22	7.2
17	6.7	28	62	30	45	30	149	62	27	12	21	7.4
18	6.7	26	55	28	47	34	134	57	25	13	21	6.9
19	6.7	24	54	29	47	42	121	56	23	12	19	7.9
20	7.4	45	55	32	51	42	108	63	22	11	17	9.4
21	8.1	70	53	32	54	42	96	59	21	11	16	17
22	7.6	68	49	32	57	42	85	69	19	46	17	14
23	7.4	64	49	35	60	41	78	107	19	76	17	12
24	7.2	69	55	34	57	39	71	114	18	62	16	11
25	7.4	68	71	27	51	37	64	99	16	40	15	10
26	7.4	63	86	26	46	38	59	86	16	30	15	9.9
27	7.6	58	98	24	41	48	54	76	16	25	14	9.7
28	7.6	55	105	23	39	80	57	67	38	22	21	9.1
29	7.9	62	113	23	---	99	68	68	58	21	19	8.8
30	8.1	68	107	28	---	99	76	74	54	43	16	8.1
31	9.1	---	88	30	---	88	---	69	---	54	14	---
TOTAL	244.3	1344	2264	1221	1130	1465	3172	3533	1143	854	854	289.5
MEAN	7.88	44.8	73.0	39.4	40.4	47.3	106	114	38.1	27.5	27.5	9.65
MAX	9.6	70	113	78	60	99	162	262	68	76	61	17
MIN	6.7	15	43	23	26	30	54	56	16	11	14	6.5
CFSM	.16	.92	1.50	.81	.83	.97	2.18	2.34	.78	.57	.57	.20
IN.	.19	1.03	1.73	.93	.86	1.12	2.42	2.70	.87	.65	.65	.22

CAL YR 1982 TOTAL 22287.4 MEAN 61.1 MAX 518 MIN 5.9 CFSM 1.26 IN 17.02
WTR YR 1983 TOTAL 17513.8 MEAN 48.0 MAX 262 MIN 6.5 CFSM .99 IN 13.38

04096600 COLDWATER RIVER NEAR HODUNK, MI

LOCATION.--Lat 42°01'45", long 85°06'25", in NW1/4 NE1/4 sec.22, T.5 S., R.7 W., Branch County, Hydrologic Unit 04050001, on downstream side of bridge on Girard Rd., 2.5 mi northwest of Hodunk, and 3.5 mi upstream from mouth.

DRAINAGE AREA.--293 mi^2.

PERIOD OF RECORD.--October 1962 to current year.

REVISED RECORDS.--WDR MI-76-1: 1974.

GAGE.--Water-stage recorder. Altitude of gage is 900 ft from topographic map (nearest 10 ft). Prior to July 26, 1963, nonrecording gage and crest-stage gage at same site and datum.

REMARKS.--Records good except those for period of no gage-height record, May 28 to June 26, which are fair. Diurnal fluctuation caused by mills above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--21 years, 253 ft^3/s, 11.73 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,260 ft^3/s Mar. 18, 1982, gage height, 8.25 ft; minimum, 6.2 ft^3/s Sept. 26, 1964; minimum gage height, 2.28 ft Oct. 4-14, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,530 ft^3/s May 3, gage height, 7.04 ft; minimum, 44 ft^3/s Sept. 14, 15, 16; minimum gage height, 2.71 ft Sept. 13, 14, 15, 16.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	82	204	401	566	238	255	536	620	450	191	189	94
2	77	404	386	523	245	250	529	1080	430	187	178	92
3	73	572	393	487	285	246	569	1470	430	179	169	88
4	70	472	446	446	291	241	625	1460	420	170	167	83
5	68	314	538	423	267	240	617	1350	430	163	161	81
6	67	273	627	407	260	242	611	1280	440	156	152	85
7	66	247	659	386	267	261	636	1180	430	149	144	115
8	64	230	615	378	253	310	657	1210	400	141	136	109
9	62	224	563	368	249	305	745	1270	370	135	129	92
10	62	224	520	363	242	182	888	1180	340	131	123	50
11	61	226	475	365	230	209	970	1050	300	127	146	48
12	60	251	438	360	220	342	932	919	260	122	155	48
13	59	269	396	350	222	321	905	814	240	117	150	47
14	59	267	383	335	222	302	1040	756	230	113	140	45
15	59	251	378	319	228	289	1180	704	220	108	129	45
16	58	238	404	310	230	277	1170	577	210	105	121	47
17	62	230	440	294	253	265	1070	465	200	109	118	48
18	65	222	438	286	278	266	997	462	190	114	116	48
19	68	218	415	280	285	285	933	476	180	112	112	50
20	75	269	409	276	291	301	866	502	180	107	107	51
21	77	328	401	256	300	305	808	493	170	105	104	58
22	82	363	388	251	310	301	714	525	160	148	103	61
23	86	370	378	251	317	307	523	629	150	240	101	61
24	87	386	393	251	314	303	508	684	150	246	98	58
25	87	396	490	249	300	296	496	661	140	204	93	54
26	89	373	572	245	282	290	486	616	130	165	91	53
27	92	348	599	238	271	318	468	575	125	143	90	53
28	93	343	628	234	261	463	468	538	147	132	110	52
29	93	370	679	230	---	594	487	520	173	126	112	53
30	92	404	675	234	---	633	534	500	182	152	102	59
31	92	---	619	242	---	579	---	470	---	196	97	---
TOTAL	2287	9286	15146	10203	7411	9778	21970	25036	7877	4593	3943	1928
MEAN	73.8	310	489	329	265	315	732	808	263	148	127	64.3
MAX	93	572	679	566	317	633	1180	1470	450	246	189	115
MIN	58	204	378	230	220	182	468	462	125	105	90	45
CFSM	.25	1.06	1.67	1.12	.90	1.08	2.50	2.76	.90	.51	.43	.22
IN.	.29	1.18	1.92	1.30	.94	1.24	2.79	3.18	1.00	.58	.50	.24

CAL YR 1982 TOTAL 140120 MEAN 384 MAX 2240 MIN 53 CFSM 1.31 IN 17.79
WTR YR 1983 TOTAL 119458 MEAN 327 MAX 1470 MIN 45 CFSM 1.12 IN 15.17

04096900 NOTTAWA CREEK NEAR ATHENS, MI

LOCATION.--Lat 42°03'20", long 85°18'30", in NW1/4 sec.12, T.5 S., R.9 W., St. Joseph County, Hydrologic Unit 04050001, on right bank at downstream side of bridge on Shorts Road, 4.2 mi southwest of Athens, and 5.0 mi downstream from Pine Creek.

DRAINAGE AREA.--162 mi^2.

PERIOD OF RECORD.--October 1966 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 850 ft from topographic map (nearest 10 ft).

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--17 years, 147 ft^3/s, 12.32 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,120 ft^3/s June 29, 1978, gage height, 6.47 ft; minimum, 21 ft^3/s July 28, 29, 30, Aug. 4, 6, 1977; minimum gage height, 0.37 ft Oct. 16, 18, 20, 21, Nov. 8, 1971.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 568 ft^3/s May 3, gage height, 3.91 ft; minimum, 55 ft^3/s Sept. 14; minimum gage height, 0.91 ft Oct. 29.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	91	79	212	228	135	146	331	315	255	201	118	77
2	84	129	200	208	137	143	307	439	244	206	127	74
3	77	169	209	187	185	143	321	550	240	203	125	70
4	70	182	250	163	178	145	341	559	273	186	121	68
5	65	177	287	160	159	150	331	514	309	162	111	66
6	63	162	328	156	161	154	316	450	309	140	102	67
7	63	138	349	157	143	175	323	396	294	122	96	68
8	61	116	332	155	134	209	344	384	274	107	87	68
9	62	106	294	151	129	244	348	403	246	100	79	65
10	62	110	252	155	121	256	383	387	217	96	74	62
11	62	125	220	171	115	235	425	351	198	94	81	63
12	63	163	181	171	110	208	426	316	181	90	93	61
13	62	203	160	163	110	184	414	281	168	85	97	59
14	61	209	148	157	113	168	467	254	158	82	94	57
15	62	197	147	156	118	156	542	237	143	79	88	56
16	60	175	177	137	123	145	545	222	139	78	80	58
17	59	150	204	120	152	135	513	210	134	78	74	59
18	60	129	204	105	177	139	468	199	129	80	74	59
19	60	116	200	96	180	163	421	206	125	81	75	61
20	64	155	194	96	188	170	380	234	124	79	73	63
21	67	216	187	110	198	175	340	247	122	76	71	68
22	68	236	174	120	209	175	305	277	118	90	71	72
23	68	240	168	120	224	175	279	359	115	129	72	76
24	67	243	184	121	232	170	256	398	112	147	71	75
25	66	234	230	122	215	170	234	385	109	143	70	72
26	67	212	289	120	184	176	215	353	107	128	71	69
27	67	187	309	115	163	188	199	316	104	108	72	69
28	66	174	309	112	151	292	196	281	128	95	72	67
29	66	192	318	112	---	381	206	255	170	88	71	64
30	65	212	294	126	---	392	250	248	193	92	70	61
31	66	---	259	144	---	369	---	253	---	103	76	---
TOTAL	2044	5136	7269	4414	4444	6131	10426	10279	5438	3548	2656	1974
MEAN	65.9	171	234	142	159	198	348	332	181	114	85.7	65.8
MAX	91	243	349	228	232	392	545	559	309	206	127	77
MIN	59	79	147	96	110	135	196	199	104	76	70	56
CFSM	.41	1.06	1.44	.88	.98	1.22	2.15	2.05	1.12	.70	.53	.41
IN.	.47	1.18	1.67	1.01	1.02	1.41	2.39	2.36	1.25	.81	.61	.45

CAL YR 1982 TOTAL 68169 MEAN 187 MAX 895 MIN 59 CFSM 1.15 IN 15.65
WTR YR 1983 TOTAL 63759 MEAN 175 MAX 559 MIN 56 CFSM 1.08 IN 14.64

04097195 GOURDNECK CANAL NEAR SCHOOLCRAFT, MI

LOCATION.--Lat 42°09'54", long 85°36'15", in NW1/4 sec.33, T.3 S., R.11 W., Kalamazoo County, Hydrologic Unit 04050001, on right bank at downstream end of culvert on Osterhout Avenue, 3.8 mi northeast of Schoolcraft.

DRAINAGE AREA.--Indeterminate.

PERIOD OF RECORD.--October 1965 to December 1972, October 1982 to September 1983.

GAGE.--Water-stage recorder. Metal V-notch weir Aug. 4, 1969 to Dec. 31, 1972. Datum of gage is 854.98 ft National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources).

REMARKS.--Records fair. Canal diverts water from Gourdneck Creek to West Lake to sustain lake levels. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--8 years, 3.78 ft^3/s.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 16 ft^3/s Dec. 10-12, 1966, Apr. 22-24, 1967; no flow on many days during November, December, 1970, January, February, 1971.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.6	.23	4.1	2.4	1.7	1.6	1.8	2.5	2.7	2.1	2.6	2.0
2	1.6	.99	3.6	2.4	2.0	1.6	1.8	5.6	2.7	2.2	2.6	2.0
3	1.6	2.2	3.5	2.5	2.1	1.6	1.9	5.0	2.7	2.1	2.7	1.8
4	1.6	1.9	3.4	2.5	2.0	1.6	1.9	4.1	2.8	2.1	2.9	1.8
5	1.6	1.1	3.1	2.6	2.0	1.5	1.8	3.6	2.6	2.2	2.8	1.8
6	1.6	.66	2.6	2.5	2.0	1.5	1.8	3.3	2.7	2.1	2.9	1.8
7	1.7	.52	2.7	2.5	2.0	1.5	1.8	3.4	2.7	2.1	2.9	1.8
8	1.8	.43	2.9	2.4	1.9	1.6	1.9	4.0	2.5	2.2	3.0	1.7
9	1.9	.52	2.6	2.5	1.9	1.6	1.9	3.6	2.6	2.3	2.9	1.6
10	2.0	1.1	2.5	2.5	1.9	1.6	1.9	3.3	2.6	2.4	2.9	1.5
11	2.0	1.6	2.4	2.4	1.9	1.6	1.9	3.2	2.5	2.4	3.0	1.5
12	2.0	3.8	2.4	2.2	1.9	1.7	1.9	3.1	2.5	2.4	3.0	1.6
13	2.0	4.4	2.3	2.3	1.9	1.7	2.0	3.0	2.5	2.4	2.9	1.5
14	2.0	4.2	2.3	2.3	1.9	1.7	2.7	2.9	2.5	2.4	2.9	1.5
15	1.8	3.6	2.3	2.3	1.9	1.7	2.4	2.9	2.5	2.5	2.8	1.5
16	1.8	2.8	2.3	2.3	1.9	1.6	2.1	2.7	2.4	2.5	2.5	1.6
17	1.3	2.3	2.3	2.3	1.8	1.8	2.0	2.7	2.4	2.5	2.6	1.7
18	1.1	1.9	2.2	2.3	1.8	1.9	2.0	2.6	2.4	2.5	2.6	1.7
19	.82	1.7	2.2	2.2	1.7	2.0	2.0	3.2	2.4	2.5	2.7	1.9
20	.69	3.8	2.2	2.2	1.7	1.9	2.0	3.3	2.3	2.5	2.6	2.0
21	.36	4.4	2.2	2.2	1.8	2.0	2.0	3.1	2.3	2.5	2.5	2.0
22	.35	4.4	2.2	2.2	1.8	2.0	2.0	3.8	2.2	2.5	2.5	1.8
23	.27	4.3	2.2	2.0	1.7	1.9	2.1	3.8	2.2	2.5	2.3	1.7
24	.22	4.2	2.2	1.9	1.8	1.7	2.1	3.4	2.1	2.5	2.4	1.6
25	.20	4.1	2.5	1.9	1.8	1.7	2.2	3.3	2.1	2.5	2.3	1.7
26	.58	3.9	2.5	1.9	1.8	1.7	2.1	3.0	2.0	2.5	2.3	1.6
27	2.4	3.4	2.6	1.8	1.7	1.7	2.2	2.8	2.2	2.4	2.3	1.7
28	1.2	3.2	2.6	1.8	1.6	1.7	2.2	2.8	2.3	2.4	2.2	1.8
29	1.4	4.4	2.5	1.7	---	1.7	2.1	3.0	2.3	2.4	2.0	2.0
30	2.6	4.2	2.4	1.8	---	1.7	2.3	3.0	2.2	2.5	2.0	2.0
31	.73	---	2.4	1.8	---	1.7	---	2.9	---	2.6	1.8	---
TOTAL	42.82	80.25	80.2	68.6	51.9	52.8	60.8	102.9	72.9	73.7	80.4	52.2
MEAN	1.38	2.68	2.59	2.21	1.85	1.70	2.03	3.32	2.43	2.38	2.59	1.74
MAX	2.6	4.4	4.1	2.6	2.1	2.0	2.7	5.6	2.8	2.6	3.0	2.0
MIN	.20	.23	2.2	1.7	1.6	1.5	1.8	2.5	2.0	2.1	1.8	1.5

WTR YR 1983 TOTAL 819.47 MEAN 2.25 MAX 5.6 MIN .20

04097500 ST. JOSEPH RIVER AT THREE RIVERS, MI

LOCATION.--Lat 41°56'25", long 85°38'00", in SW1/4 SE1/4 sec.18, T.6 S., R.11 W., St. Joseph County, Hydrologic Unit 04050001, on right bank in Scidmore Park at Three Rivers, 250 ft downstream from Rocky River, and at mile 112.

DRAINAGE AREA.--1,350 mi^2.

PERIOD OF RECORD.--May 1953 to September 1983 (discontinued).

REVISED RECORDS.--WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 781.34 ft National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources).

REMARKS.--Records good. Flow regulated by powerplant above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--30 years, 1,154 ft^3/s, 11.61 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 8,180 ft^3/s Mar. 21, 1982, gage height, 10.69 ft; minimum daily, 78 ft^3/s Sept. 12, 1964.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum discharge since at least 1918, 8,260 ft^3/s Apr. 27, 1950.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 4,320 ft^3/s May 10, gage height, 7.71 ft; minimum, 252 ft^3/s Sept. 13, 14; minimum gage height, 2.13 ft Sept. 2; minimum daily discharge, 256 ft^3/s Sept. 14.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	866	949	1350	2200	1070	1460	2440	2470	2010	1250	1010	660
2	865	1020	1860	2230	1310	1310	2560	2960	2110	1620	1100	535
3	813	1020	1890	2110	1370	1280	2480	3700	2080	1640	1110	466
4	718	1210	2010	1980	1360	1420	2530	3920	1920	1390	1010	502
5	656	1260	2120	1840	1530	1280	2620	4020	2020	1270	1110	516
6	567	1330	2210	1700	1420	1260	2410	4030	2050	1170	936	730
7	659	1330	2600	1710	1380	1300	2550	3850	1980	1180	869	488
8	854	1270	2480	1710	1360	1550	2640	3730	1920	1020	1030	545
9	646	1240	2510	1650	1340	1500	2760	3500	1750	880	860	615
10	643	1350	2520	1630	1320	1580	3070	3880	1730	827	729	422
11	805	1360	2180	1590	1330	1670	2480	3690	1750	1190	888	282
12	668	1270	2160	1520	1310	1640	3250	3300	1550	801	805	274
13	614	1440	2010	1610	1090	1460	3210	3150	1460	740	607	294
14	661	1450	1890	1600	1080	1340	3380	2970	1420	890	965	256
15	628	1440	1740	1530	1020	1390	3720	2750	1300	811	1170	655
16	624	1410	1650	1420	1260	1350	3930	2490	1330	555	944	565
17	653	1380	1780	1410	1280	1280	3830	2160	1260	595	1160	378
18	555	1340	1830	1260	1290	1360	3500	2060	938	947	1070	511
19	535	1090	1840	1040	1390	1400	3510	2080	1050	794	780	838
20	722	1460	1840	1030	1460	1420	3130	2060	1080	541	580	665
21	946	1520	1820	1150	1540	1430	2860	2110	1010	743	545	694
22	887	1590	1780	1290	1670	1460	3000	2330	908	711	788	706
23	670	1640	1750	1280	1540	1510	2720	2380	711	562	746	910
24	1010	1680	1760	1210	1630	1740	2580	2470	1090	1010	560	595
25	848	1840	1810	1260	1660	1540	2390	2770	734	1200	475	484
26	617	1800	2020	1250	1770	1500	2140	2680	642	973	671	934
27	800	1760	2440	1120	1400	1400	1830	2540	951	984	620	820
28	677	1750	2350	1250	1510	1570	2030	2140	1260	875	555	535
29	642	1790	2490	1230	---	2110	2140	2130	1300	693	565	630
30	636	1680	2460	1260	---	2650	2120	2550	1430	911	580	640
31	426	---	2490	1220	---	2460	---	2110	---	1050	555	---
TOTAL	21911	42669	63640	46290	38690	47620	83810	88960	42744	29823	25393	17145
MEAN	707	1422	2053	1493	1382	1536	2794	2870	1425	962	819	572
MAX	1010	1840	2600	2230	1770	2650	3930	4030	2110	1640	1170	934
MIN	426	949	1350	1030	1020	1260	1830	2060	642	541	475	256
CFSM	.52	1.05	1.52	1.11	1.02	1.14	2.07	2.13	1.06	.71	.61	.42
IN.	.60	1.18	1.75	1.28	1.07	1.31	2.31	2.45	1.18	.82	.70	.47

CAL YR 1982 TOTAL 606663 MEAN 1662 MAX 7810 MIN 350 CFSM 1.23 IN 16.72
WTR YR 1983 TOTAL 548715 MEAN 1503 MAX 4030 MIN 256 CFSM 1.11 IN 15.12

04097540 PRAIRIE RIVER NEAR NOTTAWA, MI

LOCATION.--Lat 41°53'18", long 85°24'34", in NW1/4 SW1/4 sec.6, T.7 S., R.9 W., St. Joseph County, Hydrologic Unit 04050001, on left bank 10 ft upstream from bridge on State Highway 66, 3.0 mi upstream from unnamed tributary, and 3.0 mi southeast of Nottawa.

DRAINAGE AREA.--106 mi^2.

PERIOD OF RECORD.--October 1962 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 850 ft from topographic map (nearest 10 ft).

REMARKS.--Records good except those for period of no gage-height record, Dec. 22 to Jan. 25, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--21 years, 92.9 ft^3/s, 11.90 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 698 ft^3/s Mar. 20, 1982, gage height, 6.12 ft; minimum, 11 ft^3/s Aug. 9, 10, Sept. 8, 9, 10, 1964; minimum gage height, 1.77 ft Aug. 9, 10, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 367 ft^3/s May 5, gage height, 4.98 ft; minimum daily, 32 ft^3/s Sept. 5, 15; minimum gage height, 2.24 ft Sept. 14, 15.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	60	50	150	200	99	99	159	169	158	153	57	36
2	57	72	150	190	103	97	157	242	150	176	58	35
3	55	100	150	170	112	96	161	302	145	172	58	34
4	54	117	170	160	118	94	163	344	141	154	60	33
5	52	119	210	150	132	93	163	363	136	136	62	32
6	50	112	230	150	108	94	165	347	136	121	68	33
7	52	103	240	140	106	98	168	318	134	111	71	33
8	51	95	220	140	103	110	169	337	131	103	69	34
9	49	90	200	135	101	120	171	331	127	96	66	34
10	49	86	190	130	99	115	178	309	122	90	62	33
11	48	86	180	130	97	109	185	288	116	85	66	34
12	47	93	165	125	108	105	189	259	111	81	66	34
13	46	98	155	120	92	101	197	230	107	76	66	33
14	45	99	145	120	91	97	224	212	102	71	64	33
15	45	96	141	120	91	95	237	195	100	68	62	32
16	45	93	147	115	92	92	247	180	98	64	58	33
17	44	88	151	115	99	90	255	170	95	62	57	33
18	44	85	153	115	108	92	241	161	91	60	56	34
19	43	83	152	110	113	96	221	161	88	60	54	39
20	46	96	149	105	115	101	204	164	86	60	52	42
21	47	113	145	105	116	107	189	163	85	58	50	46
22	47	125	145	100	118	106	178	171	83	64	48	48
23	46	129	150	100	120	105	168	192	80	63	46	49
24	46	132	160	100	119	104	158	195	76	63	44	50
25	45	133	175	100	115	101	149	197	72	62	42	48
26	44	130	190	100	110	99	143	189	70	58	40	46
27	44	130	200	99	105	104	136	176	71	55	39	44
28	44	130	215	96	102	125	136	163	94	50	38	43
29	45	140	230	95	---	150	136	158	115	47	38	42
30	45	150	220	99	---	168	150	158	143	51	37	41
31	46	---	210	100	---	170	---	161	---	53	37	---
TOTAL	1481	3173	5488	3834	2992	3333	5397	7005	3263	2623	1691	1141
MEAN	47.8	106	177	124	107	108	180	226	109	84.6	54.5	38.0
MAX	60	150	240	200	132	170	255	363	158	176	71	50
MIN	43	50	141	95	91	90	136	158	70	47	37	32
CFSM	.45	1.00	1.67	1.17	1.01	1.02	1.70	2.13	1.03	.80	.51	.36
IN.	.52	1.11	1.93	1.35	1.05	1.17	1.89	2.46	1.15	.92	.59	.40

CAL YR 1982 TOTAL 46178 MEAN 127 MAX 688 MIN 34 CFSM 1.20 IN 16.21
WTR YR 1983 TOTAL 41421 MEAN 113 MAX 363 MIN 32 CFSM 1.07 IN 14.54

04097970 LIME LAKE OUTLET AT PANAMA, IN

LOCATION.--Lat 41°42'46", long 85°07'10", in NW1/4 NW1/4 sec.35, T.38 N., R.12 E., Steuben County, Hydrologic Unit 04050001, on right bank 10 ft downstream from dam for Lime Lake, 30 ft upstream from bridge on Orland Road, and 0.7 mile northwest of Panama.

DRAINAGE AREA.--17.5 mi^2, of which 3.68 mi^2 does not contribute directly to surface runoff.

PERIOD OF RECORD.--October 1969 to current year.

GAGE.--Water-stage recorder. Datum of gage is 950.00 ft National Geodetic Vertical Datum of 1929.

REMARKS.--Records good. Occasional regulation by control structure for Lime Lake.

AVERAGE DISCHARGE.--14 years, 7.72 ft^3/s, 5.99 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 46 ft^3/s Apr. 3, 1982, gage height, 4.85 ft; no flow at times during 1971 and 1972.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 33 ft^3/s May 8, gage height, 4.46 ft; minimum daily, 0.44 ft^3/s Sept. 15.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3.3	4.8	20	23	12	10	2.9	23	2.2	11	2.9	1.1
2	3.2	10	20	22	13	9.9	4.5	30	2.6	11	2.6	1.0
3	2.9	11	22	22	13	9.8	13	30	3.3	15	2.4	1.0
4	2.7	10	24	22	13	9.8	23	31	3.6	17	4.2	.93
5	2.5	8.9	26	21	13	9.8	23	31	3.9	15	4.7	.89
6	2.5	7.9	26	20	13	10	23	31	5.5	13	4.6	.85
7	2.5	18	26	20	13	11	23	32	5.9	13	4.3	.79
8	2.3	23	26	19	13	11	23	33	6.0	12	3.9	.72
9	2.2	21	25	19	13	11	23	32	6.0	11	3.4	.69
10	2.2	18	25	19	12	11	24	31	6.2	12	3.1	.65
11	2.0	17	24	18	12	10	24	30	6.4	12	4.4	.61
12	1.8	17	23	17	12	10	24	29	6.8	5.9	3.9	.55
13	1.7	15	23	17	12	10	24	28	6.9	2.0	3.7	.50
14	1.6	15	22	16	11	9.8	27	27	6.8	2.1	3.4	.45
15	1.3	15	22	16	11	9.3	26	26	6.2	2.3	3.3	.44
16	1.2	15	23	15	11	6.2	25	25	6.0	2.4	3.1	.47
17	1.2	14	23	15	11	.61	25	24	5.5	2.3	3.3	.47
18	1.2	14	23	15	11	.53	24	23	5.0	2.4	3.3	.53
19	1.2	14	22	14	11	.55	23	22	4.5	2.6	3.2	.76
20	1.5	18	22	14	11	.51	23	22	4.3	2.5	3.0	1.1
21	1.2	19	21	13	11	.49	23	21	4.0	2.5	2.8	1.9
22	1.1	19	21	13	11	.49	22	23	3.8	3.0	2.4	1.7
23	1.1	19	21	13	11	.53	21	23	3.6	2.7	2.2	1.5
24	1.1	19	22	13	11	.55	21	22	3.3	2.4	2.0	1.5
25	1.1	19	24	13	10	.62	20	21	3.2	2.2	1.9	1.4
26	1.1	19	24	13	10	.74	19	20	3.0	2.0	1.8	10
27	1.2	19	25	13	10	.95	19	19	3.4	1.9	1.7	14
28	1.3	19	26	12	10	1.4	20	18	11	1.7	1.6	13
29	1.3	20	25	12	---	1.8	21	18	12	1.6	1.4	12
30	1.3	20	24	12	---	2.2	22	7.9	12	1.9	1.4	11
31	2.0	---	24	12	---	2.4	---	1.9	---	2.9	1.2	---
TOTAL	54.8	478.6	724	503	325	172.97	635.4	754.8	162.9	191.3	91.1	82.50
MEAN	1.77	16.0	23.4	16.2	11.6	5.58	21.2	24.3	5.43	6.17	2.94	2.75
MAX	3.3	23	26	23	13	11	27	33	12	17	4.7	14
MIN	1.1	4.8	20	12	10	.49	2.9	1.9	2.2	1.6	1.2	.44
CFSM	.10	.91	1.34	.93	.66	.32	1.21	1.39	.31	.35	.17	.16
IN.	.12	1.02	1.54	1.07	.69	.37	1.35	1.60	.35	.41	.19	.18

CAL YR 1982 TOTAL 4957.03 MEAN 13.6 MAX 44 MIN .35 CFSM .78 IN 10.54
WTR YR 1983 TOTAL 4176.37 MEAN 11.4 MAX 33 MIN .44 CFSM .65 IN 8.88

04099000 ST. JOSEPH RIVER AT MOTTVILLE, MI

LOCATION.--Lat 41°48'03", long 85°45'22", in SW1/4 sec.6, T.8 S., R.12 W., Michigan Meridian, St. Joseph County, Hydrologic Unit 04050001, on right bank 500 ft upstream from bridge on U.S. Highway 12 at Mottville, 0.4 mi downstream from Michigan Power Co. hydroelectric plant, 4 mi upstream from Pigeon River, and at mile 96.

DRAINAGE AREA.--1,866 mi^2.

PERIOD OF RECORD.--October 1923 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1387: 1930, 1932, 1938, 1940-42, 1945. WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 755.3 ft Michigan Power Co. datum. Prior to Oct. 1, 1951, at site 0.4 mi upstream at datum 4.2 ft higher.

REMARKS.--Records good. Flow regulated by powerplants above station. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--60 years, 1,584 ft^3/s, 11.53 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 10,700 ft^3/s Apr. 27, 1950, gage height, 10.76 ft, present datum; minimum daily, 39 ft^3/s Oct. 19, 1963.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 5,430 ft^3/s May 11, gage height, 6.99 ft; minimum, 92 ft^3/s July 22, gage height, 1.16 ft; minimum daily, 557 ft^3/s Sept. 3.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1210	1100	2280	3200	1730	2020	3050	3050	2870	1970	1530	843
2	1400	1210	2290	2910	1730	1960	3250	4100	2860	1930	1580	920
3	1330	1580	2570	2970	1960	1800	3350	4420	3000	2500	1310	557
4	1190	1570	2740	2780	1940	1870	3240	5040	2920	2170	1500	575
5	1140	1750	2900	2700	2000	1890	3360	5080	2780	2140	1540	658
6	904	1630	2990	2470	2020	1860	3320	5220	2830	1900	1320	1120
7	944	1680	3330	2430	1960	1880	3150	5190	2790	1810	1270	1030
8	1110	1780	3590	2450	1930	2010	3530	5040	2730	1650	1510	708
9	1010	1700	3350	2410	1930	2140	3440	4950	2660	1280	1150	872
10	736	1790	3460	2360	1880	2130	3770	4720	2410	1320	1140	573
11	1210	1890	3160	2350	1880	2200	3640	5080	2500	1500	1320	587
12	1140	1860	3030	2180	1800	2240	3490	4780	2410	1440	1120	897
13	1040	1840	2810	2330	1810	2190	4270	4370	2100	1280	888	580
14	960	1970	2720	2250	1530	1950	4320	4270	2230	1130	967	563
15	944	2160	2640	2240	1570	1930	4730	3950	1880	1340	1740	658
16	952	2100	2520	2160	1720	1930	4870	3610	1940	1020	1530	1020
17	952	1610	2490	1950	1780	1970	4960	3280	1890	787	1420	706
18	944	1920	2560	1940	1880	1810	4770	2900	1700	1360	1540	644
19	824	1830	2600	1790	1740	1920	4470	3020	1360	1420	1370	747
20	904	1860	2620	1660	1910	1990	4490	3000	1620	995	1170	1020
21	1110	2230	2590	1660	2000	2070	3910	3020	1900	888	836	1130
22	1370	2150	2570	1830	2110	1990	3820	3160	1340	917	689	1020
23	1050	2290	2490	1920	2140	2070	3870	3530	1190	933	996	1070
24	808	2220	2530	1920	2150	2210	3620	3390	1370	614	1160	1100
25	1280	2390	2630	1890	2170	2230	3280	3600	1240	1600	801	837
26	1280	2520	2670	1790	2230	2050	3110	3740	935	1400	903	1090
27	1120	2460	2940	1870	2160	2050	2750	3600	1400	1260	709	1280
28	872	2430	3240	1710	1990	2190	2730	3300	1390	1230	727	1090
29	896	2480	3290	1770	---	2510	2900	3100	1670	1170	1150	950
30	672	2460	3270	1790	---	3100	3010	3120	1840	913	868	940
31	640	---	3260	1860	---	3340	---	3300	---	1540	889	---
TOTAL	31942	58460	88130	67540	53650	65500	110470	121930	61755	43407	36643	25785
MEAN	1030	1949	2843	2179	[illegible]	2113	3682	3933	2059	1400	1182	860
MAX	1400	2520	3590	3200	[illegible]	3340	4960	5220	3000	2500	1740	1280
MIN	640	1100	2280	1660	1530	1800	2730	2900	935	614	689	557
CFSM	.55	1.04	1.52	1.17	1.03	1.13	1.97	2.11	1.10	.75	.63	.46
IN.	.64	1.17	1.76	1.35	1.07	1.31	2.20	2.43	1.23	.87	.73	.51

CAL YR 1982 TOTAL 872555 MEAN 2391 MAX 9950 MIN 640 CFSM 1.28 IN 17.39
WTR YR 1983 TOTAL 765212 MEAN 2096 MAX 5220 MIN 557 CFSM 1.12 IN 15.26

04099750 PIGEON RIVER NEAR SCOTT, IN

LOCATION.--Lat 41°44'56", long 85°34'35", in SE1/4 NW1/4 sec.14, T.38 N., R.8 E., Lagrange County, Hydrologic Unit 04050001, on right bank 20 ft downstream from bridge on County Road 750 North, 1,200 ft downstream from Page ditch, 0.7 mile south of Indiana-Michigan State line, and 1.2 miles northwest of Scott.

DRAINAGE AREA.--361 mi^2, of which 53.9 mi^2 does not contribute directly to surface runoff.

PERIOD OF RECORD.--June 1968 to current year.

REVISED RECORDS.--WSP 2111: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 815.00 ft National Geodetic Vertical Datum of 1929.

REMARKS.--Records good.

AVERAGE DISCHARGE.--15 years, 362 ft^3/s, 13.62 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,370 ft^3/s Mar. 21, 1982, gage height, 7.85 ft; minimum daily, 42 ft^3/s Oct. 21, 1971.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,330 ft^3/s May 3, gage height, 6.04 ft; minimum daily, 115 ft^3/s Sept. 15.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	202	231	579	715	311	337	548	644	460	359	235	133
2	195	399	560	688	337	317	603	891	440	383	211	128
3	189	575	628	653	402	316	673	1220	428	410	195	126
4	186	540	753	607	399	313	711	1290	430	399	199	123
5	185	481	866	564	384	310	694	1250	412	381	205	124
6	182	485	955	535	384	311	699	1240	415	359	198	129
7	183	493	1020	514	378	337	731	1250	435	333	193	135
8	182	486	977	488	368	380	737	1310	405	308	183	129
9	181	476	933	465	357	372	725	1310	380	288	167	126
10	186	459	909	454	348	355	737	1220	364	292	159	123
11	192	446	873	452	334	343	769	1120	355	277	181	122
12	179	468	817	436	328	336	753	1010	342	252	196	121
13	171	469	749	417	309	330	765	912	327	234	186	119
14	167	444	690	404	302	325	882	831	314	223	182	118
15	164	409	657	394	306	317	994	773	302	216	182	115
16	161	385	670	378	312	307	999	714	283	201	146	120
17	158	366	688	365	324	298	950	620	279	197	140	127
18	154	350	643	350	333	306	929	581	271	207	173	129
19	144	338	604	340	339	329	906	567	263	205	173	145
20	153	397	588	335	351	322	869	574	255	195	167	155
21	168	494	566	330	363	336	820	541	249	188	159	170
22	163	501	539	321	376	340	764	572	236	193	151	173
23	156	503	523	335	384	334	707	621	226	192	149	162
24	153	528	526	336	384	330	656	591	220	187	143	155
25	152	539	595	326	376	323	604	544	210	178	138	149
26	152	516	670	320	366	319	558	519	206	173	139	148
27	152	507	710	312	357	347	522	494	207	164	141	147
28	151	516	732	304	338	455	490	472	321	159	141	146
29	151	562	769	300	---	527	505	475	439	161	137	139
30	157	601	770	314	---	514	563	495	394	209	131	138
31	169	---	739	323	---	515	---	480	---	239	132	---
TOTAL	5238	13964	22298	13075	9850	10901	21863	25131	9868	7762	5232	4074
MEAN	169	465	719	422	352	352	729	811	329	250	169	136
MAX	202	601	1020	715	402	527	999	1310	460	410	235	173
MIN	144	231	523	300	302	298	490	472	206	159	131	115
CFSM	.47	1.29	1.99	1.17	.98	.98	2.02	2.25	.91	.69	.47	.38
IN.	.54	1.44	2.30	1.35	1.02	1.12	2.25	2.59	1.02	.80	.54	.42

CAL YR 1982 TOTAL 199030 MEAN 545 MAX 2340 MIN 144 CFSM 1.51 IN 20.51
WTR YR 1983 TOTAL 149256 MEAN 409 MAX 1310 MIN 115 CFSM 1.13 IN 15.38

04100222 NORTH BRANCH ELKHART RIVER AT COSPERVILLE, IN

LOCATION.--Lat 41°28'54", long 85°28'32", in NE1/4 NW1/4 sec.22, T.35 N., R.9 E., Noble County, Hydrologic Unit 04050001, on right bank at downstream side of bridge on County Road 900 North, 1,300 ft downstream from Boyd ditch, 1.7 miles upstream from Hustin ditch, and 3.1 miles downstream from Waldron Lake.

DRAINAGE AREA.--142 mi^2.

PERIOD OF RECORD.--October 1971 to current year. October 1950 to September 1971 at site 3.1 miles upstream, published as North Branch Elkhart River near Cosperville. Records may not be equivalent.

GAGE.--Water-stage recorder. Datum of gage is 880.12 ft National Geodetic Vertical Datum of 1929 (levels by State of Indiana, Department of Natural Resources).

REMARKS.--Records good. Flow regulated at times by dam at Waldron Lake.

AVERAGE DISCHARGE.--12 years, 137 ft^3/s, 13.10 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 919 ft^3/s Mar. 23, 1982, gage height, 8.12 ft; minimum daily, 2.4 ft^3/s Nov. 21, 1971.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 476 ft^3/s May 6, gage height, 6.11 ft; minimum daily, 7.8 ft^3/s Sept. 15.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	53	79	287	315	120	120	158	256	175	138	48	16
2	52	183	286	317	135	119	173	375	167	147	43	14
3	48	249	306	314	164	119	203	441	164	148	38	14
4	47	269	347	309	161	118	209	461	160	143	41	13
5	45	272	382	306	151	120	203	474	154	134	42	12
6	43	271	403	298	143	125	197	474	159	124	41	12
7	43	263	401	289	139	140	194	469	160	113	38	12
8	41	250	389	280	131	163	194	462	155	104	35	12
9	41	239	385	269	129	168	197	445	147	98	33	12
10	40	225	380	261	126	164	206	425	139	91	29	11
11	37	213	375	248	121	158	214	403	133	77	30	11
12	35	209	364	229	117	152	213	382	126	78	30	11
13	34	207	349	211	116	147	213	363	120	69	26	9.7
14	33	202	334	197	115	141	253	343	114	53	27	8.5
15	32	192	329	184	117	137	286	325	109	59	23	7.8
16	32	185	339	171	121	131	301	303	102	60	23	9.2
17	31	185	337	161	129	127	310	281	96	57	25	9.9
18	30	192	323	147	133	131	315	261	89	56	29	11
19	30	199	312	126	135	131	310	245	68	54	30	21
20	33	236	300	113	135	135	303	234	68	51	28	30
21	36	263	287	105	137	141	292	221	69	47	27	54
22	36	272	275	106	140	131	284	218	65	49	24	54
23	35	272	265	121	140	119	274	229	63	48	23	50
24	34	271	266	129	137	113	261	226	61	45	22	45
25	34	266	303	127	133	106	245	218	58	42	20	42
26	32	261	325	125	127	103	231	209	60	37	19	41
27	33	256	328	120	123	114	214	200	80	38	19	39
28	32	262	336	117	121	160	211	190	102	31	19	37
29	45	277	342	115	---	185	209	188	129	25	16	35
30	87	286	334	119	---	186	225	186	137	48	16	33
31	74	---	321	121	---	174	---	181	---	52	16	---
TOTAL	1258	7006	10310	6050	3696	4278	7098	9688	3429	2316	880	687.1
MEAN	40.6	234	333	195	132	138	237	313	114	74.7	28.4	22.9
MAX	87	286	403	317	164	186	315	474	175	148	48	54
MIN	30	79	265	105	115	103	158	181	58	25	16	7.8
CFSM	.29	1.65	2.35	1.37	.93	.97	1.67	2.20	.80	.53	.20	.16
IN.	.33	1.84	2.70	1.58	.97	1.12	1.86	2.54	.90	.61	.23	.18

CAL YR 1982 TOTAL 74770.0 MEAN 205 MAX 916 MIN 22 CFSM 1.44 IN 19.59
WTR YR 1983 TOTAL 56696.1 MEAN 155 MAX 474 MIN 7.8 CFSM 1.09 IN 14.85

04100500 ELKHART RIVER AT GOSHEN, IN

LOCATION.--Lat 41°35'36", long 85°50'55", in NE1/4 NE1/4 sec.8, T.36 N., R.6 E., Elkhart County, Hydrologic Unit 04050001, on right bank 20 ft downstream from River Avenue bridge at Goshen, 0.4 mile upstream from Rock Run, and at mile 16.1.

DRAINAGE AREA.--594 mi^2.

PERIOD OF RECORD.--April 1931 to current year.

REVISED RECORDS.--WSP 1337: 1939(M). WSP 1557: 1954. WSP 2111: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 769.43 ft National Geodetic Vertical Datum of 1929. Prior to Nov. 20, 1931, nonrecording gage at same site and datum.

REMARKS.--Records good.

AVERAGE DISCHARGE.--52 years, 514 ft^3/s, 11.75 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 6,180 ft^3/s Mar. 14, 1982, gage height, 11.94 ft; minimum daily, 7.0 ft^3/s Aug. 11, 1964, result of extreme regulation.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 1,800 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Dec. 6	1300	2,050	5.85	May 3	0300	*3,070	*7.53
Apr. 15	0600	2,290	6.26				

Minimum daily discharge, 108 ft^3/s Sept. 15.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	284	282	1090	1150	502	538	830	1210	744	422	300	135
2	272	546	1000	1110	552	526	1010	2520	706	507	268	129
3	262	1000	1210	1060	733	515	1560	2800	693	535	247	127
4	261	1070	1700	1030	716	475	1500	2250	684	479	270	122
5	255	931	1940	988	603	459	1260	2000	659	441	297	120
6	253	873	2030	953	591	462	1150	1830	672	420	274	119
7	259	872	1880	921	593	496	1200	1760	685	405	244	125
8	250	870	1640	889	587	551	1240	2130	648	386	239	122
9	250	855	1490	848	571	576	1140	2130	602	363	212	118
10	244	816	1400	834	563	557	1140	1720	563	357	202	114
11	240	795	1330	807	541	542	1130	1490	551	346	208	113
12	237	823	1250	777	521	527	1080	1350	521	314	200	112
13	232	850	1170	736	514	514	1140	1240	499	299	193	110
14	230	800	1110	703	505	502	1870	1160	479	282	186	110
15	223	731	1070	674	512	491	2180	1090	471	261	185	108
16	220	681	1080	640	531	474	1790	1020	449	252	172	118
17	216	654	1140	602	567	465	1540	963	424	248	186	121
18	214	619	1080	547	586	512	1410	912	406	247	206	120
19	215	607	1020	508	586	533	1330	900	392	236	197	178
20	209	696	982	516	587	536	1250	875	371	235	184	188
21	193	892	944	547	586	554	1180	830	352	228	173	187
22	189	944	901	559	587	556	1100	883	340	214	168	195
23	186	927	876	563	585	555	1050	1070	329	207	162	197
24	180	963	888	558	592	552	992	1010	315	210	154	190
25	178	954	1120	536	582	545	938	865	298	211	146	182
26	178	897	1400	519	565	539	892	793	290	199	143	181
27	177	867	1350	505	552	599	847	747	294	189	146	180
28	174	887	1380	496	545	1020	839	721	344	176	146	175
29	167	1090	1530	483	---	1140	818	759	397	179	147	169
30	165	1220	1350	501	---	942	930	901	412	309	142	164
31	212	---	1210	514	---	856	---	816	---	349	139	---
TOTAL	6825	25012	39561	22074	16055	18109	36336	40745	14590	9506	6136	4329
MEAN	220	834	1276	712	573	584	1211	1314	486	307	198	144
MAX	284	1220	2030	1150	733	1140	2180	2800	744	535	300	197
MIN	165	282	876	483	502	459	818	721	290	176	139	108
CFSM	.37	1.40	2.15	1.20	.97	.98	2.04	2.21	.82	.52	.33	.24
IN.	.43	1.57	2.48	1.38	1.01	1.13	2.28	2.55	.91	.60	.38	.27

CAL YR 1982 TOTAL 302128 MEAN 828 MAX 5950 MIN 157 CFSM 1.39 IN 18.92
WTR YR 1983 TOTAL 239278 MEAN 656 MAX 2800 MIN 108 CFSM 1.10 IN 14.99

04101000 ST. JOSEPH RIVER AT ELKHART, IN

LOCATION.--Lat 41°41'30", long 85°58'30", in SW1/4 NE1/4 sec.5, T.37 N., R.5 E., Elkhart County, Hydrologic Unit 04050001, on left bank 200 ft downstream from mouth of Elkhart River, 200 ft upstream from Main Street bridge in Elkhart, 2,000 ft downstream from Christiana Creek, 0.5 mile downstream from Elkhart Hydroelectric Plant, and at mile 76.5.

DRAINAGE AREA.--3,370 mi^2.

PERIOD OF RECORD.--August 1947 to current year. Gage heights at site 0.8 mile downstream at different datum from September 1924 to March 1926 are available from the district office.

REVISED RECORDS.--WSP 2111: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 700.00 ft National Geodetic Vertical Datum of 1929.

REMARKS.--Records good. Flow regulated by Elkhart Hydroelectric Plant.

AVERAGE DISCHARGE.--36 years, 3,177 ft^3/s, 12.80 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 18,600 ft^3/s Mar. 21, 1982, gage height, 27.91 ft; minimum daily, 336 ft^3/s Aug. 5, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 10,100 ft^3/s May 3, gage height, 23.62 ft; minimum daily, 1,010 ft^3/s Sept. 14.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1920	1860	4720	5810	3250	3560	5170	6010	5030	3280	2740	1340
2	2210	2600	4310	5470	3260	3410	5590	8490	4710	3550	2530	1360
3	2190	3710	5590	5240	3950	3210	6660	9600	4870	4130	2320	1080
4	2190	3870	6080	4970	3880	3220	6510	9300	4900	3660	2350	1030
5	1810	3620	6550	4720	3630	3260	6130	9250	4660	3590	2470	1130
6	1830	3950	7010	4830	3640	3210	6050	9040	4650	3220	2270	1620
7	1710	3670	6820	4310	3630	3340	6070	9060	4670	2980	2060	1540
8	1780	3710	6890	4610	3540	3620	6320	9470	4530	3010	2240	1200
9	1810	3640	6650	4320	3530	3690	6190	9460	4410	2430	1960	1280
10	1660	3520	6420	4170	3490	3720	6330	8740	4100	2480	1790	1040
11	1990	3840	6270	4010	3360	3660	6540	8530	4060	2530	1840	1040
12	1810	3820	5870	4320	3180	3760	5960	8170	4030	2580	2020	1390
13	1880	3790	5450	3900	3160	3680	6890	7610	3620	2290	1520	1060
14	1970	3820	5330	4190	3020	3100	8290	7180	3440	2020	1590	1010
15	1930	3870	5260	3910	2950	2990	8890	6860	3430	2120	2160	1110
16	1800	3760	5170	3820	3080	3250	8720	6350	3210	2190	2400	1520
17	1700	3330	5080	3550	3410	3300	8460	5960	3120	1530	2130	1270
18	1730	3360	5070	3160	3540	3200	8210	5350	2860	1980	2040	1170
19	1690	3310	5030	2920	3350	3320	7690	5360	2530	2380	2120	1270
20	1600	3570	5050	3010	3460	3510	7550	5390	2590	1820	1830	1770
21	1860	4120	4810	3250	3700	3700	7090	5290	2750	1880	1530	1640
22	2010	4460	4720	3380	3730	3490	6520	5630	2490	1470	1270	1590
23	2190	4230	4750	3480	3910	3620	6600	6130	2180	1830	1400	1900
24	1390	4450	4550	3530	3690	3590	6240	5940	2180	1310	1820	1620
25	1770	4380	5350	3350	3820	3740	5840	5890	2140	1960	1430	1610
26	1910	4580	5610	3260	3870	3500	5410	5930	1870	2260	1310	1640
27	2000	4510	5640	3330	3760	3690	5110	5740	2190	2040	1260	1810
28	1620	4530	6180	3060	3550	4690	4870	5430	2630	1680	1210	1900
29	1620	4870	6300	3140	---	4950	5060	5100	2950	2150	1670	1570
30	1460	5050	6290	3220	---	5340	5570	5160	3220	1810	1400	1490
31	1520	---	5950	3310	---	5430	---	5350	---	2450	1400	---
TOTAL	56560	115800	174770	121550	98340	113750	196530	216770	104020	74610	58080	42000
MEAN	1825	3860	5638	3921	3512	3669	6551	6993	3467	2407	1874	1400
MAX	2210	5050	7010	5810	3950	5430	8890	9600	5030	4130	2740	1900
MIN	1390	1860	4310	2920	2950	2990	4870	5100	1870	1310	1210	1010
CFSM	.54	1.15	1.67	1.16	1.04	1.09	1.94	2.08	1.03	.71	.56	.42
IN.	.62	1.28	1.93	1.34	1.09	1.26	2.17	2.39	1.15	.82	.64	.46

CAL YR 1982 TOTAL 1650260 MEAN 4521 MAX 18500 MIN 1320 CFSM 1.34 IN 18.22
WTR YR 1983 TOTAL 1372780 MEAN 3761 MAX 9600 MIN 1010 CFSM 1.12 IN 15.15

04101500 ST. JOSEPH RIVER AT NILES, MI
(National stream-quality accounting network station)

LOCATION.--Lat 41°49'45", long 86°15'35", in SW1/4 sec.26, T.7 S., R.17 W., Berrien County, Hydrologic Unit 04050001, on right bank 100 ft upstream from Main Street Bridge at Niles, 0.6 mi downstream from dam at French Paper Co., 1 mi upstream from Dowagiac River, and at mile 44.

DRAINAGE AREA.--3,666 mi^2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1930 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1387: 1931, 1933-36, 1940-43, 1945-46(M). WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 633.02 ft National Geodetic Vertical Datum of 1929. Prior to Oct. 1, 1968, at datum 2.00 ft higher. Oct. 1, 1930 to Feb. 11, 1931, nonrecording gage on Main Street Bridge, and Feb. 12 to June 30, 1931, nonrecording gage 50 ft upstream from present site (gage heights referred to NGVD). Since Apr. 13, 1970, auxiliary water-stage recorder at sewage-treatment plant, 1.1 mi downstream from base gage at same datum. Oct. 1, 1943 to Apr. 12, 1970, auxiliary gage was headwater gage at hydroelectric plant at Buchanan Dam, 8 mi downstream from base gage at different datum.

REMARKS.--Water-discharge records good except those for period of no gage-height record, Nov. 7 to Dec. 14, which are fair. Flow regulated by powerplants above station.

AVERAGE DISCHARGE.--53 years, 3,259 ft^3/s, 12.07 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 20,200 ft^3/s Apr. 5, 1950, gage height, 15.10 ft, present datum; minimum daily, 420 ft^3/s Aug. 30, 1931.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 12,400 ft^3/s May 3, gage height, 11.36 ft; minimum daily, 1,230 ft^3/s Sept. 15.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2220	2060	4600	6450	3650	3870	5090	6580	5410	3650	3320	1830
2	2270	3010	4500	6260	3790	3940	6050	9260	5130	4000	2790	1740
3	2450	3580	5000	5920	4210	3320	7770	12100	5060	4260	2980	1450
4	2440	4200	5300	5550	4490	3540	7980	11000	5180	4520	2700	1440
5	2450	4130	5500	4370	4240	3620	7180	10400	5120	3880	2800	1400
6	2400	3980	5900	6210	4190	3610	6830	9980	5050	3950	2820	1620
7	2370	3600	6300	4050	3870	3660	6630	10100	5010	3640	2610	2060
8	2030	3400	6700	5280	3590	3670	7090	10500	4900	3130	2780	1940
9	2070	3400	6800	5030	3920	4100	7290	10700	4730	3280	2460	1830
10	2050	3500	6700	4820	3760	4160	7020	10200	4700	2700	2490	1250
11	2000	3600	6400	3640	3810	3960	7390	9360	4330	2890	2170	1380
12	2310	3700	6100	4950	3910	3660	7010	9040	4420	3030	2130	1410
13	2300	3700	5800	4160	3740	4240	7160	8490	4280	2790	2290	1700
14	2310	3800	5640	4270	3460	4030	9450	7990	3930	2570	2160	1460
15	2440	4200	5600	4430	3000	3250	11300	7460	4130	2480	1930	1230
16	2210	4100	5480	4340	3370	3250	10400	6720	3800	2540	2950	1550
17	2000	3300	5490	4360	3730	3560	9910	6510	3710	2420	2830	1660
18	1930	3500	5430	3440	3820	3580	9230	6140	4040	2140	2400	1730
19	1950	3700	5400	3420	3960	3550	8790	5630	3500	2250	2420	1870
20	2010	3800	5500	2950	3670	3670	8100	5770	3140	2780	2430	1890
21	2060	4000	5440	3340	3920	4020	8000	5690	3240	2200	2300	2570
22	2280	4200	5100	3790	3990	3910	7140	5870	3610	2170	2060	1910
23	2440	4400	4870	3810	4280	3720	6880	6690	2810	2120	1500	1950
24	2270	4500	5010	3800	4070	4070	6920	6660	2330	2140	1770	2190
25	1660	4600	5650	3710	3930	3870	6590	6140	2770	1910	2440	2100
26	1950	4800	6610	3610	4030	3980	5970	6570	2770	2410	1830	1890
27	2430	4800	6240	3550	4040	4000	5570	5910	1600	2540	1530	1910
28	2430	4800	6630	3590	3940	5000	5350	6060	3040	2350	1590	2120
29	1670	4800	7030	3560	---	5780	5290	5880	3330	1970	1710	2200
30	1950	4800	6900	3550	---	5700	5850	5690	3290	3420	2120	1890
31	1970	---	6730	3570	---	5990	---	5650	---	2390	1840	---
TOTAL	67320	117960	180350	133780	108380	124280	222030	240740	118360	88520	72150	53170
MEAN	2172	3932	5818	4315	3871	4009	7401	7766	3945	2855	2327	1772
MAX	2450	4800	7030	6450	4490	5990	11300	12100	5410	4520	3320	2570
MIN	1660	2060	4500	2950	3000	3250	5290	5630	1600	1910	1500	1230
CFSM	.59	1.07	1.59	1.18	1.06	1.09	2.02	2.12	1.08	.78	.64	.48
IN.	.68	1.20	1.83	1.36	1.10	1.26	2.25	2.44	1.20	.90	.73	.54

CAL YR 1982 TOTAL 1797690 MEAN 4925 MAX 19800 MIN 1390 CFSM 1.34 IN 18.24
WTR YR 1983 TOTAL 1527040 MEAN 4184 MAX 12100 MIN 1230 CFSM 1.14 IN 15.50

04101500 ST. JOSEPH RIVER AT NILES, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1979 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: February 1979 to current year.
WATER TEMPERATURE: February 1979 to current year.

INSTRUMENTATION.--Water-quality monitor since Oct. 9, 1980.

REMARKS.--Bimonthly samples collected from Grant Street bridge 0.2 mi upstream from gage. Interruptions in the daily record were due to malfunctions of the instrument.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum (water years 1979, 1982), 678 micromhos Feb. 16, 1982; minimum (water years 1979, 1982), 278 micromhos Mar. 19, 1982.
WATER TEMPERATURES: Maximum daily recorded (water years 1980, 1982-83), 29.0°C July 20, 21, 1980; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum, 28.5°C July 21, 22; minimum, 0.0°C on several days during winter period.

WATER QUALITY DATA, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (STAND-ARD UNITS)	TEMPER-ATURE (DEG C)	TUR-BID-ITY (NTU)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)
NOV										
03...	1400	3800	551	7.8	12.0	5.5	10.2	97	K5000	1500
DEC										
14...	1400	5740	550	7.9	1.0	3.1	14.8	106	570	240
MAR										
09...	1445	4210	532	8.3	10.5	5.0	10.7	97	1800	400
APR										
19...	1145	8860	466	8.3	6.5	6.9	13.0	106	390	350
JUL										
13...	1015	2860	541	8.4	24.0	12	8.2	98	920	1800
SEP										
15...	0930	1250	544	8.1	20.0	3.5	8.5	95	470	500

DATE	HARD-NESS (MG/L AS CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	PERCENT SODIUM	SODIUM AD-SORP-TION RATIO	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	ALKA-LINITY LAB (MG/L AS CACO3)	CARBON DIOXIDE DIS-SOLVED (MG/L AS CO2)
NOV									
03...	255	69	20	11	9	.3	1.6	211	6.5
DEC									
14...	262	72	20	10	8	.3	2.2	201	4.9
MAR									
09...	251	69	19	10	8	.3	1.9	207	2.0
APR									
19...	239	66	18	8.7	7	.3	2.1	181	1.7
JUL									
13...	266	72	21	12	9	.3	1.7	198	1.5
SEP									
15...	261	68	22	15	11	.4	1.9	184	2.8

DATE	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER AC-FT)	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)
NOV									
03...	46	20	.2	8.0	298	303	.41	3060	1.3
DEC									
14...	54	18	.1	8.4	300	305	.41	4650	1.5
MAR									
09...	48	21	.2	5.2	316	299	.43	3590	1.5
APR									
19...	45	16	.1	5.3	297	270	.40	7100	1.5
JUL									
13...	46	23	.2	5.5	275	300	.37	2120	.83
SEP									
15...	47	29	.2	8.4	381	302	.52	1290	1.1

04101500 ST. JOSEPH RIVER AT NILES, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DATE	NITROGEN, AMMONIA DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS, DISSOLVED (MG/L AS P)	PHOSPHORUS, ORTHO, DISSOLVED (MG/L AS P)	PHOSPHATE, ORTHO, DISSOLVED (MG/L AS PO4)	SEDIMENT, SUSPENDED (MG/L)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
NOV									
03...	.120	1.20	.070	.050	.020	.06	39	400	100
DEC									
14...	.160	1.40	.060	.020	.020	.06	8	124	100
MAR									
09...	.170	.90	.060	<.010	<.010	--	15	171	100
APR									
19...	.100	1.00	.070	.020	.030	.09	22	526	100
JUL									
13...	.040	1.00	.090	.040	<.010	--	--	--	95
SEP									
15...	.300	1.40	.080	.030	--	--	11	37	100

DATE	TIME	ALUMINUM, DISSOLVED (UG/L AS AL)	ARSENIC DISSOLVED (UG/L AS AS)	BARIUM, DISSOLVED (UG/L AS BA)	BERYLLIUM, DISSOLVED (UG/L AS BE)	CADMIUM DISSOLVED (UG/L AS CD)	CHROMIUM, DISSOLVED (UG/L AS CR)	COBALT, DISSOLVED (UG/L AS CO)	COPPER, DISSOLVED (UG/L AS CU)	IRON, DISSOLVED (UG/L AS FE)	LEAD, DISSOLVED (UG/L AS PB)
NOV											
03...	1400	10	2	62	1	<1	<1	<3	1	39	2
MAR											
09...	1445	<10	1	62	<1	<1	<1	<3	4	49	2
APR											
19...	1145	10	1	82	1	<1	<1	<3	8	62	6
SEP											
15...	0930	10	2	75	<1	<1	<1	<3	1	4	2

DATE	LITHIUM DISSOLVED (UG/L AS LI)	MANGANESE, DISSOLVED (UG/L AS MN)	MERCURY DISSOLVED (UG/L AS HG)	MOLYBDENUM, DISSOLVED (UG/L AS MO)	NICKEL, DISSOLVED (UG/L AS NI)	SELENIUM, DISSOLVED (UG/L AS SE)	SILVER, DISSOLVED (UG/L AS AG)	STRONTIUM, DISSOLVED (UG/L AS SR)	VANADIUM, DISSOLVED (UG/L AS V)	ZINC, DISSOLVED (UG/L AS ZN)
NOV										
03...	9	14	<.1	<10	1	<1	<1	120	<6.0	<4
MAR										
09...	<4	4	<.1	<10	5	<1	<1	130	<6.0	6
APR										
19...	<4	9	.1	<10	3	<1	<1	110	<6.0	9
SEP										
15...	<4	9	.1	<10	1	<1	<1	120	<6.0	6

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04101500 ST. JOSEPH RIVER AT NILES, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	494	487	490	555	548	550	---	---	---	552	547	549
2	509	498	503	546	529	541	---	---	---	553	549	551
3	516	509	513	546	541	544	---	---	---	557	546	552
4	525	522	524	558	542	548	---	---	---	559	555	557
5	537	530	535	565	553	559	---	---	---	566	554	559
6	534	527	531	564	554	559	---	---	---	565	554	558
7	531	518	525	---	---	---	---	---	---	569	553	559
8	534	520	529	---	---	---	---	---	---	569	562	565
9	538	532	535	---	---	---	---	---	---	566	563	565
10	539	522	529	---	---	---	---	---	---	567	564	565
11	534	523	531	---	---	---	---	---	---	567	560	566
12	538	524	534	---	---	---	---	---	---	574	560	567
13	532	525	529	---	---	---	---	---	---	569	559	560
14	534	527	531	---	---	---	---	---	---	569	558	565
15	535	531	533	---	---	---	582	578	580	565	558	560
16	536	534	535	---	---	---	584	582	583	570	557	566
17	537	530	536	---	---	---	584	581	582	569	568	568
18	538	531	533	---	---	---	583	581	582	569	566	568
19	543	533	536	---	---	---	582	579	580	575	565	570
20	541	534	539	---	---	---	580	576	578	577	564	575
21	545	535	538	---	---	---	581	574	578	579	575	577
22	539	538	539	---	---	---	581	574	576	586	573	579
23	540	538	540	---	---	---	574	573	574	589	582	585
24	541	529	535	---	---	---	584	572	579	583	572	579
25	547	531	542	---	---	---	578	563	573	578	571	575
26	548	541	545	---	---	---	571	561	563	574	571	573
27	546	542	543	---	---	---	557	550	553	570	569	569
28	547	545	546	---	---	---	552	540	547	569	568	568
29	556	544	550	---	---	---	546	539	543	568	565	567
30	561	557	560	---	---	---	545	538	543	567	563	565
31	558	547	552	---	---	---	541	538	539	564	562	563
MONTH	561	487	534							589	546	566

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	566	563	564	528	524	526	488	484	486	489	461	483
2	---	---	---	527	515	524	492	477	485	464	440	453
3	---	---	---	528	523	525	477	453	469	440	393	404
4	---	---	---	531	521	525	458	449	453	411	393	398
5	549	546	547	524	513	522	465	456	460	435	411	427
6	552	544	547	522	520	521	479	466	475	439	434	436
7	555	550	553	521	517	520	486	479	483	445	437	440
8	556	553	554	521	517	519	488	484	487	443	438	442
9	552	551	552	520	516	518	490	486	488	442	435	439
10	551	549	550	519	514	517	495	488	491	457	439	445
11	551	548	549	515	512	514	495	490	492	475	457	466
12	550	548	549	514	512	513	494	487	490	476	472	473
13	549	547	548	513	511	512	495	485	492	485	476	481
14	554	549	551	516	512	513	485	447	469	489	483	486
15	555	553	554	517	513	516	444	414	422	490	484	487
16	553	551	552	520	517	518	436	421	428	495	489	492
17	552	549	551	520	516	518	451	436	445	504	491	496
18	552	549	550	519	516	517	459	450	454	502	496	498
19	550	546	548	518	510	514	464	456	459	500	482	492
20	547	542	544	514	511	513	474	465	468	500	491	496
21	543	541	542	516	511	513	478	472	474	500	496	498
22	542	538	540	536	515	525	489	477	483	501	484	492
23	540	535	538	536	525	531	493	488	490	490	478	485
24	537	535	536	525	512	516	492	489	490	482	476	480
25	535	533	534	513	508	511	495	491	493	484	471	477
26	536	532	534	511	508	510	497	494	496	482	473	476
27	533	530	532	515	510	512	501	496	500	481	475	479
28	530	527	529	513	501	507	502	497	500	480	472	477
29	---	---	---	500	486	490	502	497	498	479	472	475
30	---	---	---	486	480	483	498	479	486	481	474	477
31	---	---	---	485	479	482	---	---	---	482	473	477
MONTH				536	479	514	502	414	477	504	393	469

04101500 ST. JOSEPH RIVER AT NILES, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1				---	---	---	499	476	488	544	535	540
2				---	---	---	498	479	489	547	540	544
3				---	---	---	501	490	496	548	540	543
4				---	---	---	502	493	498	546	539	542
5				---	---	---	505	496	502	543	537	540
6				---	---	---	510	502	507	567	536	550
7				---	---	---	513	506	509	553	537	544
8				---	---	---	511	505	507	553	539	546
9				---	---	---	547	508	528	560	546	553
10				---	---	---	529	520	526	564	546	555
11				---	---	---	528	515	525	553	543	550
12				---	---	---	529	525	527	552	538	545
13				585	558	575	533	527	530	542	534	538
14				557	528	539	543	535	540	536	531	534
15				531	520	524	542	530	536	537	530	534
16				521	506	515	543	522	530	542	535	538
17				512	509	511	528	515	524	539	529	534
18				515	511	513	530	520	524	537	528	532
19				519	515	517	534	524	529	532	517	526
20				515	510	513	535	525	529	518	502	508
21				520	514	516	534	519	525	517	498	505
22				521	515	519	529	512	521	514	506	510
23				522	520	521	544	517	527	520	510	514
24				522	516	518	550	541	545	512	503	507
25				524	518	521	545	536	540	510	506	508
26				531	523	527	554	542	548	512	507	509
27				523	516	520	552	543	547	516	510	512
28				521	515	518	550	543	546	518	512	515
29				523	508	519	546	539	542	515	508	511
30				516	476	490	544	533	538	520	507	512
31				501	488	494	541	530	535	---	---	---
MONTH							554	476	524	567	498	530

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	18.5	17.5	18.0	13.0	11.5	12.0	---	---	---	2.5	1.5	2.0
2	19.0	18.0	18.5	13.5	12.5	13.0	---	---	---	2.0	1.5	2.0
3	19.5	18.5	19.0	13.0	12.0	12.5	---	---	---	1.5	1.0	1.5
4	19.0	18.0	18.5	12.5	11.0	12.0	---	---	---	1.5	.5	1.0
5	20.0	18.5	19.0	11.0	9.0	10.0	---	---	---	1.5	1.0	1.5
6	20.5	19.5	20.0	9.0	8.0	8.5	---	---	---	1.5	.5	1.0
7	20.5	19.5	20.0	---	---	---	---	---	---	2.0	1.0	1.5
8	19.5	18.5	19.0	---	---	---	---	---	---	2.0	1.0	1.5
9	19.5	18.5	19.0	---	---	---	---	---	---	2.0	1.0	1.5
10	19.5	18.5	18.5	---	---	---	---	---	---	3.0	2.0	2.5
11	19.0	17.0	18.0	---	---	---	---	---	---	3.0	2.5	3.0
12	17.0	16.5	17.0	---	---	---	---	---	---	3.0	2.0	2.5
13	16.5	16.0	16.0	---	---	---	---	---	---	2.5	1.5	2.0
14	16.0	15.0	15.5	---	---	---	---	---	---	2.0	1.5	1.5
15	15.0	14.5	15.0	---	---	---	1.5	1.0	1.5	1.5	.5	1.0
16	14.5	13.0	13.5	---	---	---	2.0	1.5	2.0	1.0	.5	1.0
17	13.0	12.5	12.5	---	---	---	2.5	1.5	2.0	1.0	.0	.5
18	13.0	12.0	12.5	---	---	---	3.0	2.0	2.5	.5	.0	.0
19	13.0	12.5	13.0	---	---	---	2.5	2.0	2.5	.5	.0	.0
20	13.0	11.5	12.0	---	---	---	2.5	2.0	2.5	.5	.0	.0
21	11.5	10.5	10.5	---	---	---	2.5	2.0	2.5	1.0	.0	.5
22	10.5	10.5	10.5	---	---	---	2.5	1.5	2.0	1.0	.5	.5
23	10.5	9.5	10.0	---	---	---	3.5	2.5	3.0	1.0	.5	.5
24	10.5	9.5	10.0	---	---	---	5.0	3.5	4.0	1.0	.5	1.0
25	10.0	9.0	9.5	---	---	---	6.5	4.5	6.0	1.0	.5	1.0
26	10.5	9.0	10.0	---	---	---	7.5	6.5	7.0	1.0	.5	1.0
27	10.5	9.0	10.0	---	---	---	7.5	7.0	7.5	1.0	.5	1.0
28	11.0	10.0	10.5	---	---	---	7.5	6.0	7.0	1.5	1.0	1.0
29	11.5	10.5	11.0	---	---	---	6.5	4.5	5.5	2.0	1.0	1.5
30	11.0	10.5	11.0	---	---	---	4.5	3.0	4.0	2.0	1.5	1.5
31	12.0	10.5	11.0	---	---	---	3.5	2.0	2.5	1.5	1.5	1.5
MONTH	20.5	9.0	14.5							3.0	.0	1.0

04101500 ST. JOSEPH RIVER AT NILES, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATFR YEAR OCTOBER 1982 TO SEPTEMBER 1983

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	2.0	1.5	2.0	6.0	5.0	5.5	8.0	7.0	7.5	14.0	13.0	13.5
2	---	---	---	7.0	5.5	6.5	8.0	7.0	7.5	13.5	12.5	13.0
3	---	---	---	9.0	6.5	7.5	8.0	7.5	7.5	13.0	12.5	12.5
4	---	---	---	9.5	8.5	9.0	8.0	7.5	7.5	13.0	12.0	12.5
5	2.0	1.5	1.5	11.0	9.5	10.0	7.5	7.5	7.5	13.5	12.0	12.5
6	2.0	1.5	1.5	12.0	11.0	11.5	8.0	7.5	8.0	14.0	13.0	13.5
7	2.0	1.0	1.5	12.5	12.0	12.0	9.0	8.0	8.5	14.5	14.0	14.0
8	2.0	1.5	2.0	12.5	11.5	12.0	9.5	8.0	9.0	15.0	14.0	14.5
9	2.0	2.0	2.0	11.5	10.5	11.0	9.0	9.0	9.0	15.0	13.5	14.5
10	2.0	1.5	2.0	10.0	9.0	9.5	9.0	8.5	9.0	15.5	14.0	14.5
11	2.0	1.0	1.5	8.5	7.0	8.0	8.5	8.0	8.5	16.0	14.5	15.5
12	2.0	1.5	2.0	7.5	6.5	7.0	9.0	7.5	8.5	17.0	15.5	16.0
13	2.5	1.5	2.0	7.5	6.5	7.0	10.0	8.5	9.0	17.5	16.5	17.0
14	3.0	2.0	2.5	7.5	7.0	7.0	10.5	10.0	10.5	17.5	17.0	17.5
15	3.0	3.0	3.0	8.5	7.0	7.5	10.5	9.5	10.0	17.5	16.5	17.0
16	3.5	3.0	3.5	9.0	8.0	8.5	9.5	9.0	9.0	17.5	15.5	16.5
17	4.0	3.5	4.0	9.5	8.5	9.0	9.0	8.0	8.5	16.5	15.5	16.0
18	4.0	4.0	4.0	9.5	9.0	9.0	8.0	7.0	7.5	16.5	15.5	16.0
19	5.0	4.0	4.5	9.0	8.0	9.0	7.0	6.5	6.5	17.0	16.0	16.5
20	5.5	4.5	5.5	8.0	6.5	7.5	7.5	6.0	6.5	17.0	16.0	16.5
21	6.5	5.5	6.0	6.5	6.0	6.0	8.5	6.5	7.5	17.5	16.0	17.0
22	7.5	6.5	7.0	6.0	5.5	5.5	10.5	8.0	9.0	17.5	17.0	17.5
23	7.5	7.0	7.5	5.5	4.5	5.0	11.5	10.0	10.5	18.0	17.0	17.5
24	7.5	6.5	7.0	5.0	4.0	4.5	12.5	10.5	11.5	18.5	17.0	17.5
25	6.5	6.0	6.5	5.0	4.0	4.5	13.0	11.0	12.0	18.5	17.5	18.0
26	6.0	5.5	5.5	5.5	4.5	5.0	13.5	12.0	12.5	18.0	17.0	17.5
27	5.5	5.0	5.0	6.0	5.5	5.5	15.0	13.0	14.0	18.0	16.5	17.0
28	6.0	4.5	5.5	6.0	5.5	5.5	14.5	14.0	14.0	17.5	16.5	17.0
29	---	---	---	6.5	5.0	6.0	15.0	13.5	14.5	17.5	16.5	17.0
30	---	---	---	7.0	5.5	6.0	15.0	14.0	14.0	17.0	16.0	16.5
31	---	---	---	7.5	6.0	6.5	---	---	---	16.5	15.5	16.0
MONTH				12.5	4.0	7.5	15.0	6.0	9.5	18.5	12.0	15.5

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	16.5	15.0	15.5	25.0	23.5	24.0	27.0	25.0	26.5	25.5	24.5	25.0
2	16.0	15.5	16.0	24.5	23.0	23.5	27.0	25.5	26.5	25.5	24.5	25.0
3	16.0	15.5	15.5	25.0	24.0	24.5	27.0	26.0	26.5	25.5	24.5	25.0
4	17.0	15.5	16.5	25.0	24.5	24.5	26.5	26.0	26.5	25.0	24.5	24.5
5	17.5	16.0	17.0	24.5	23.5	24.0	26.5	26.0	26.5	25.0	24.5	24.5
6	18.5	17.0	17.5	24.0	23.0	23.5	27.0	26.0	26.5	24.5	24.0	24.5
7	19.0	17.0	18.0	24.0	22.5	23.0	27.0	25.0	26.0	24.5	23.5	24.0
8	19.5	17.5	18.5	24.0	22.5	23.5	27.5	25.0	26.0	24.0	23.0	23.5
9	20.0	18.5	19.0	24.5	23.0	23.5	27.0	26.0	26.5	24.5	23.0	24.0
10	21.5	19.0	20.0	24.5	23.5	24.0	26.0	25.5	26.0	25.0	24.0	24.5
11	22.0	19.5	20.5	25.5	24.0	24.5	26.0	24.5	25.5	24.5	23.5	24.0
12	23.0	21.0	22.0	25.5	24.5	25.0	24.5	23.5	24.0	23.5	22.0	23.0
13	24.0	22.0	23.0	26.0	24.0	25.5	25.5	24.0	24.5	22.5	22.0	22.0
14	24.5	23.0	23.5	26.5	25.5	26.0	25.0	24.0	24.5	22.0	20.5	21.5
15	24.5	23.5	24.0	27.0	25.0	26.5	25.5	24.0	24.5	20.5	19.5	20.0
16	25.0	23.5	24.0	27.5	25.0	27.0	25.5	24.0	25.0	20.0	19.5	19.5
17	25.0	23.5	24.5	27.5	25.0	26.5	25.5	24.5	25.0	20.5	19.5	20.0
18	25.0	23.5	24.5	27.5	25.5	27.0	26.0	25.0	25.5	21.0	20.0	20.5
19	24.5	24.0	24.0	28.0	26.5	27.5	27.0	25.5	26.5	21.5	20.5	21.0
20	24.5	23.0	24.0	28.0	25.5	26.5	27.5	25.0	26.5	21.0	---	20.5
21	25.5	23.5	24.5	28.5	25.5	27.0	27.0	25.0	26.0	19.5	18.0	18.5
22	25.5	23.5	24.5	28.5	25.5	27.0	27.0	25.0	26.0	18.0	16.5	17.5
23	26.0	24.5	25.5	28.0	25.5	27.0	26.5	26.0	26.0	17.0	16.0	16.5
24	26.0	24.5	25.5	28.0	25.0	26.5	26.5	25.5	26.0	16.5	15.5	16.0
25	26.5	25.0	25.5	27.5	25.0	26.5	27.0	26.0	26.5	16.5	15.0	15.5
26	27.0	25.5	26.5	27.5	25.0	26.5	26.5	25.5	26.0	16.0	15.0	15.5
27	27.0	23.5	26.0	27.0	25.0	26.5	26.0	25.5	26.0	16.5	15.5	16.0
28	26.0	24.5	25.0	27.5	25.0	26.0	26.0	25.0	25.5	17.0	15.5	16.5
29	25.0	24.5	25.0	28.0	25.0	25.5	26.5	25.0	25.5	17.0	16.0	16.5
30	25.0	24.0	24.5	27.5	25.0	26.5	26.0	25.0	26.0	17.5	16.5	17.0
31	---	---	---	27.5	25.0	26.0	25.5	25.0	25.0	---	---	---
MONTH	27.0	15.0	22.0	28.5	22.5	25.5	27.5	23.5	26.0	25.5		20.5

04101800 DOWAGIAC RIVER AT SUMNERVILLE, MI

LOCATION.--Lat 41°54'57", long 86°12'47", in SE1/4 sec.30, T.6 S., R.16 W., Cass County, Hydrologic Unit 04050001, on right bank 30 ft upstream from bridge on Indian Lake Road, 0.3 mi west of Sumnerville.

DRAINAGE AREA.--255 mi^2.

PERIOD OF RECORD.--October 1960 to current year.

GAGE.--Water-stage recorder. Datum of gage is 692.62 ft National Geodetic Vertical Datum of 1929.

REMARKS.--Records good. Flow regulated by millpond and lake-level control dam above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--23 years, 286 ft^3/s, 15.23 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,280 ft^3/s June 26, 1968, gage height, 8.78 ft; minimum, 86 ft^3/s Sept.10, 1964; minimum gage height, 2.57 ft Aug. 8, 9, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 895 ft^3/s May 2, gage height, 7.10 ft; minimum, 124 ft^3/s Sept. 4, 5, gage height, 2.91 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	185	251	375	368	285	285	385	487	392	273	194	137
2	183	397	385	358	339	282	505	852	367	295	188	134
3	181	411	711	343	394	280	610	757	361	294	179	131
4	179	362	788	326	348	283	524	612	372	266	190	127
5	180	325	755	323	326	284	460	526	353	252	184	127
6	177	309	731	321	318	283	449	483	350	237	173	139
7	181	294	632	324	313	340	474	476	339	224	164	151
8	185	282	542	319	303	409	455	515	318	207	159	145
9	196	287	488	315	298	366	441	453	303	200	154	140
10	201	337	450	323	292	336	469	423	292	196	150	134
11	190	343	425	339	285	317	456	404	276	193	181	146
12	188	454	395	330	275	302	427	386	265	183	190	149
13	188	430	372	318	274	293	473	372	257	175	177	145
14	192	379	360	312	274	288	797	364	251	170	169	141
15	193	347	377	305	283	281	737	356	251	170	163	139
16	191	324	406	296	297	274	595	340	253	167	155	151
17	192	308	396	291	347	269	530	329	245	163	166	156
18	195	295	379	272	355	293	488	319	238	162	187	164
19	195	290	373	259	352	340	454	386	232	166	178	200
20	209	408	374	267	352	325	432	424	227	175	168	213
21	216	455	360	262	349	333	415	376	220	172	161	299
22	210	412	348	270	350	337	399	407	215	167	158	285
23	206	410	351	286	345	332	385	438	209	167	150	293
24	204	426	368	293	329	326	372	394	201	165	146	299
25	204	383	536	291	313	315	360	367	197	160	142	263
26	202	358	571	284	298	312	351	348	191	155	144	248
27	201	344	492	273	291	364	342	331	194	150	145	234
28	201	372	502	268	288	539	371	321	283	147	144	219
29	200	434	463	267	---	519	398	371	294	147	140	208
30	200	404	413	301	---	451	461	432	281	174	136	201
31	201	---	384	297	---	412	---	417	---	187	135	---
TOTAL	6026	10831	14502	9401	8873	10370	14015	13466	8227	5959	5070	5518
MEAN	194	361	468	303	317	335	467	434	274	192	164	184
MAX	216	455	788	368	394	539	797	852	392	295	194	299
MIN	177	251	348	259	274	269	342	319	191	147	135	127
CFSM	.76	1.42	1.84	1.19	1.24	1.31	1.83	1.70	1.08	.75	.64	.72
IN.	.88	1.58	2.12	1.37	1.29	1.51	2.04	1.96	1.20	.87	.74	.80

CAL YR 1982 TOTAL 127595 MEAN 350 MAX 1140 MIN 161 CFSM 1.37 IN 18.61
WTR YR 1983 TOTAL 112258 MEAN 308 MAX 852 MIN 127 CFSM 1.21 IN 16.38

04102500 PAW PAW RIVER AT RIVERSIDE, MI

LOCATION.--Lat 42°11'10", long 86°22'06", in SW1/4 SE1/4 sec.23, T.3 S., R.18 W., Berrien County, Hydrologic Unit 04050001, on left bank 40 ft upstream from bridge on Coloma Road, 0.6 mi east of Riverside.

DRAINAGE AREA.--390 mi².

PERIOD OF RECORD.--October 1951 to current year.

REVISED RECORDS.--WSP 1337: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 588.80 ft National Geodetic Vertical Datum of 1929. May 10, 1966, to July 11, 1967, nonrecording gage at same site and datum.

REMARKS.--Records good. Diurnal fluctuation, principally during low flow, caused by paper mill above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--32 years, 444 ft³/s,15.46 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,830 ft³/s Mar. 9, 1979; maximum gage height, 10.11 ft Mar. 9, 1979, Mar. 18, 1982; minimum discharge, 99 ft³/s July 5, 1964, gage height, 2.66 ft.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,220 ft³/s Dec. 8, gage height, 8.81 ft; minimum, 221 ft³/s Sept. 10; minimum gage height, 3.88 ft Sept. 5, 10.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	285	309	543	882	441	516	803	610	548	397	289	235
2	283	358	536	818	463	494	887	839	551	417	295	233
3	279	381	706	749	523	474	1020	1110	557	419	297	230
4	272	390	1110	690	572	463	1020	953	564	400	300	226
5	267	395	990	645	557	454	939	944	557	385	289	224
6	266	400	1010	600	544	448	902	1030	537	356	268	228
7	269	405	1120	566	541	458	904	1070	523	315	269	230
8	272	400	1200	548	530	494	917	1030	515	300	271	225
9	277	388	1190	535	512	536	885	948	497	302	265	227
10	287	395	1100	525	482	546	870	860	463	311	254	223
11	291	405	997	521	460	543	867	794	426	295	268	228
12	291	428	907	518	448	537	838	746	401	288	290	234
13	289	459	821	514	442	518	810	701	378	280	315	233
14	284	470	745	509	435	490	910	656	366	276	327	232
15	281	463	689	505	436	462	1110	611	360	274	311	229
16	281	459	648	494	447	443	1020	575	352	271	285	236
17	282	457	624	478	487	432	991	544	341	261	272	263
18	284	448	608	447	543	432	1010	517	341	256	273	283
19	287	425	590	432	570	464	1040	507	337	265	273	318
20	297	429	580	431	580	502	1010	530	321	273	276	345
21	310	456	574	480	590	532	935	550	314	273	265	393
22	306	477	561	462	594	550	849	559	314	272	252	398
23	309	481	555	436	600	569	778	584	310	275	247	400
24	313	490	568	429	599	581	722	609	298	276	248	420
25	310	511	696	432	588	579	672	610	295	273	247	428
26	302	516	976	431	569	566	627	599	293	265	246	419
27	294	503	872	425	554	571	590	583	292	259	248	407
28	289	495	846	417	537	669	570	561	320	255	242	395
29	288	511	902	413	---	841	565	535	351	255	239	371
30	288	541	926	423	---	788	577	523	378	294	236	334
31	290	---	918	436	---	769	---	537	---	284	236	---
TOTAL	8923	13245	25108	16191	14644	16721	25638	21825	12100	9322	8393	8847
MEAN	288	442	810	522	523	539	855	704	403	301	271	295
MAX	313	541	1200	882	600	841	1110	1110	564	419	327	428
MIN	266	309	536	413	435	432	565	507	292	255	236	223
CFSM	.74	1.13	2.08	1.34	1.34	1.38	2.19	1.81	1.03	.77	.70	.76
IN.	.85	1.26	2.39	1.54	1.40	1.59	2.45	2.08	1.15	.89	.80	.84

CAL YR 1982 TOTAL 199312 MEAN 546 MAX 2640 MIN 266 CFSM 1.40 IN 19.01
WTR YR 1983 TOTAL 180957 MEAN 496 MAX 1200 MIN 223 CFSM 1.27 IN 17.26

04102700 SOUTH BRANCH BLACK RIVER NEAR BANGOR, MI

LOCATION.--Lat 42°21'15", long 86°11'15", in NW1/4 sec.28, T.1 S., R.16 W., Van Buren County, Hydrologic Unit 04050002, on left bank 50 ft upstream from bridge on 66th Street, 4.9 mi northwest of Bangor.

DRAINAGE AREA.--83.6 mi^2.

PERIOD OF RECORD.--June 1966 to current year. Prior to October 1981, published as Black River near Bangor.

REVISED RECORDS.--WDR MI-81: 1973-75(M), 1979(M).

GAGE.--Water-stage recorder. Altitude of gage is 610 ft from topographic map (nearest 10 ft).

REMARKS.--Records good. Occasional regulation caused by mills above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--17 years, 106 ft^3/s, 17.22 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,680 ft^3/s Apr. 19, 1975, gage height, 13.16 ft; minimum, 20 ft^3/s Sept. 28, 1966, gage height, 1.83 ft.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 400 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Dec. 4	0600	*878	*10.45	Apr. 15	0300	755	9.71
Dec. 25	2400	840	10.30	May 3	0300	755	9.73
Mar. 29	0800	494	8.26				

Minimum discharge, 31 ft^3/s Sept. 5, gage height, 2.02 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	34	45	100	180	85	99	186	164	108	47	37	34
2	34	77	95	150	101	97	225	494	96	50	36	33
3	34	74	444	135	176	95	356	700	90	46	35	33
4	34	61	822	120	147	94	339	452	98	43	35	32
5	34	55	630	110	118	93	243	312	97	41	34	32
6	34	53	604	110	106	92	196	217	90	39	34	47
7	35	52	479	105	100	115	198	177	85	38	34	40
8	35	51	329	100	96	169	192	162	78	37	33	38
9	36	51	229	100	92	175	179	148	72	37	33	36
10	40	67	174	120	89	144	220	132	67	37	33	34
11	40	68	148	140	85	126	227	120	63	36	81	36
12	38	84	130	130	82	114	210	111	60	35	59	35
13	37	89	113	100	79	105	191	104	58	34	48	34
14	37	78	103	94	79	99	473	99	55	34	42	33
15	36	67	103	90	86	95	684	96	54	34	40	32
16	37	60	113	90	102	91	440	91	53	34	38	36
17	38	57	117	90	161	87	306	86	51	33	40	35
18	38	54	107	100	180	89	229	82	49	34	41	36
19	38	53	103	90	167	131	187	89	47	33	39	60
20	41	74	105	80	160	161	163	123	46	36	38	61
21	45	89	101	75	149	144	146	116	44	35	37	97
22	43	82	94	75	141	142	133	109	42	38	50	69
23	41	75	119	75	154	142	123	128	42	37	43	84
24	40	88	198	76	151	141	115	121	41	36	41	82
25	40	86	526	76	131	135	107	104	40	35	38	65
26	39	74	730	73	114	131	101	94	40	34	38	56
27	39	70	483	68	105	163	97	86	40	34	38	52
28	39	72	384	64	101	368	100	81	51	33	37	49
29	39	106	300	64	---	474	120	84	47	32	36	46
30	38	118	250	77	---	345	134	101	47	38	35	43
31	39	---	210	91	---	243	---	111	---	40	36	---
TOTAL	1172	2130	8443	3048	3337	4699	6612	5094	1851	1150	1239	1400
MEAN	37.8	71.0	272	98.3	119	152	220	164	61.7	37.1	40.0	46.7
MAX	45	118	822	180	180	474	684	700	108	50	81	97
MIN	34	45	94	64	79	87	97	81	40	32	33	32
CFSM	.45	.85	3.25	1.18	1.42	1.82	2.63	1.96	.74	.44	.48	.56
IN.	.52	.95	3.76	1.36	1.48	2.09	2.94	2.27	.82	.51	.55	.62

CAL YR 1982 TOTAL 45395 MEAN 124 MAX 1170 MIN 30 CFSM 1.48 IN 20.20
WTR YR 1983 TOTAL 40175 MEAN 110 MAX 822 MIN 32 CFSM 1.32 IN 17.88

04105000 BATTLE CREEK AT BATTLE CREEK, MI

LOCATION.--Lat 42°19'55", long 85°09'15", in NW1/4 sec.5, T.2 S., R.7 W., Calhoun County, Hydrologic Unit 04050003, on right bank 350 ft upstream from Emmett Street Bridge at Battle Creek, and 3.0 mi upstream from mouth.

DRAINAGE AREA.--241 mi^2.

PERIOD OF RECORD.--October 1930 to September 1931, October 1932 to July 1933, January 1934 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1387: 1931, 1944. WSP 1507: 1956.

GAGE.--Water-stage recorder. Datum of gage is 823.24 ft National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Prior to May 14, 1951, nonrecording gage at same site and datum.

REMARKS.--Records good. Occasional slight regulation prior to November 1943. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--50 years (water years 1931, 1935-83), 200 ft^3/s, 11.27 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,640 ft^3/s Apr. 7, 1947, gage height, 4.48 ft, from floodmark; minimum, 22 ft^3/s Aug. 14, 1934; minimum gage height, about -0.5 ft in July 1936 and on Aug. 31, 1939, due to opening of gates at dam forming control.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,130 ft^3/s Apr. 16, gage height, 2.24 ft; minimum, 45 ft^3/s Sept. 16, gage height, 0.56 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	84	77	201	370	170	240	779	387	286	168	145	59
2	77	102	208	326	172	220	717	490	277	169	151	71
3	73	132	241	276	200	210	692	701	273	142	134	54
4	70	144	278	209	223	207	723	1030	283	119	118	52
5	67	140	325	219	201	207	778	1020	296	111	108	53
6	65	124	390	191	251	212	737	857	321	106	92	63
7	63	111	455	178	249	233	663	726	342	106	84	78
8	62	103	492	172	191	269	597	655	338	101	78	69
9	63	104	475	168	174	312	574	596	313	96	77	61
10	64	115	425	169	149	361	620	584	281	92	66	56
11	66	129	372	181	129	398	769	580	251	78	164	56
12	65	147	280	189	125	403	928	524	219	83	150	50
13	63	165	252	190	133	373	904	465	194	83	141	65
14	63	173	236	182	137	331	876	409	177	71	132	55
15	63	175	222	171	146	290	934	364	162	76	113	61
16	63	161	213	125	158	256	1100	320	146	80	100	50
17	63	142	213	147	191	232	1060	289	138	70	92	60
18	62	128	215	125	221	222	900	263	131	64	89	75
19	62	120	218	115	242	239	767	263	125	70	85	107
20	64	148	220	111	253	263	661	286	120	63	79	111
21	68	198	213	113	263	289	572	308	114	72	74	111
22	68	223	208	111	282	304	497	354	111	88	73	125
23	67	243	209	115	307	314	443	405	111	87	61	120
24	66	252	223	121	325	313	398	426	111	81	76	114
25	66	244	274	127	331	303	360	474	109	75	79	99
26	66	232	343	117	325	293	325	462	100	69	65	89
27	66	219	433	111	305	295	303	407	101	82	63	87
28	66	207	509	117	272	345	307	355	114	86	64	81
29	66	199	508	115	---	443	319	323	130	99	64	77
30	66	199	455	126	---	695	344	304	158	133	73	74
31	67	---	406	148	---	835	---	296	---	135	58	---
TOTAL	2054	4856	9712	5135	6125	9907	19647	14923	5832	2955	2948	2283
MEAN	66.3	162	313	166	219	320	655	481	194	95.3	95.1	76.1
MAX	84	252	509	370	331	835	1100	1030	342	169	164	125
MIN	62	77	201	111	125	207	303	263	100	63	58	50
CFSM	.28	.67	1.30	.69	.91	1.33	2.72	2.00	.81	.40	.40	.32
IN.	.32	.75	1.50	.79	.95	1.53	3.03	2.30	.90	.46	.46	.35

CAL YR 1982 TOTAL 84468 MEAN 231 MAX 2450 MIN 53 CFSM .96 IN 13.04
WTR YR 1983 TOTAL 86377 MEAN 237 MAX 1100 MIN 50 CFSM .98 IN 13.33

04105500 KALAMAZOO RIVER NEAR BATTLE CREEK, MI

LOCATION.--Lat 42°19'26", long 85°11'51", in SW1/4 sec.1, T.2 S., R.8 W., Calhoun County, Hydrologic Unit 04050003, on left bank 20 ft upstream from bridge on Kendall Street in Battle Creek.

DRAINAGE AREA.--824 mi^2.

PERIOD OF RECORD.--July 1937 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 924: 1938-39. WSP 1387: 1938, 1945-46, 1948.

GAGE.--Water-stage recorder. Altitude of gage is 815 ft from topographic map (nearest 5 ft). Prior to Oct. 1, 1957, water-stage recorder at site 4.7 mi downstream at different datum. Oct. 1, 1957, to June 15, 1959, nonrecording gage at bridge 1,800 ft upstream at different datum. June 16, 1959, to Oct. 13, 1960, nonrecording gage at same site and datum.

REMARKS.--Records good. Diurnal fluctuation, below 1,500 ft^3/s, caused by powerplants above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--46 years, 660 ft^3/s, 10.88 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 7,290 ft^3/s Apr. 7, 1947, gage height, 9.13 ft, site and datum then in use; minimum, 50 ft^3/s Sept. 22, 1939, site then in use; minimum daily, 86 ft^3/s Aug. 5, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,500 ft^3/s May 4, gage height, 5.45 ft; minimum, 240 ft^3/s Sept. 17, 18, gage height, 3.04 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	536	427	870	1160	610	725	1730	1360	1070	910	870	415
2	504	693	940	980	725	734	1670	1860	1040	910	830	433
3	464	860	990	870	717	701	1680	2190	1070	840	610	421
4	471	753	1130	753	810	661	1670	2430	1190	753	685	403
5	445	810	1240	890	820	693	1700	2390	1230	693	542	391
6	445	772	1340	669	677	753	1690	2140	1230	555	523	445
7	427	555	1380	693	801	782	1670	1930	1230	589	549	471
8	421	603	1380	653	661	1030	1590	1950	1190	589	464	653
9	400	631	1340	603	631	1040	1600	1890	1090	582	421	439
10	380	645	1250	763	624	1070	1740	1790	1010	523	433	379
11	370	677	1000	744	523	1150	1890	1690	950	497	880	427
12	370	900	930	753	562	1000	1990	1560	782	523	850	427
13	360	820	820	744	568	1020	2020	1420	717	568	617	373
14	360	753	791	709	536	850	2140	1270	638	433	701	385
15	360	840	801	645	589	880	2200	1200	701	415	556	542
16	360	840	850	529	638	782	2290	1110	669	477	575	458
17	360	638	820	645	669	653	2210	1050	624	477	529	255
18	360	555	870	575	734	753	1990	1000	631	503	516	331
19	360	693	940	477	801	830	1780	1050	555	421	439	685
20	370	820	782	451	772	870	1620	1220	589	471	477	661
21	390	940	772	503	920	910	1490	1200	589	529	477	610
22	390	1010	772	603	910	980	1380	1420	562	709	516	610
23	380	1050	900	631	1070	880	1270	1550	536	653	427	624
24	380	1050	801	568	990	930	1190	1540	523	596	464	582
25	380	1020	1030	582	950	890	1050	1490	503	477	490	529
26	370	970	1220	542	1020	850	990	1420	477	490	427	529
27	373	801	1310	516	870	930	930	1290	523	503	409	445
28	379	940	1420	536	791	1240	1010	1150	900	529	433	477
29	415	880	1430	536	---	1420	1020	1120	1020	610	385	451
30	421	910	1350	610	---	1680	1210	1090	940	980	297	367
31	343	---	1240	617	---	1840	---	1080	---	870	409	---
TOTAL	12344	23856	32709	20550	20989	29527	48410	46850	24779	18675	16801	14218
MEAN	398	795	1055	663	750	952	1614	1511	826	602	542	474
MAX	536	1050	1430	1160	1070	1840	2290	2430	1230	980	880	685
MIN	343	427	772	451	523	653	930	1000	477	415	297	255
CFSM	.48	.97	1.28	.81	.91	1.16	1.96	1.83	1.00	.73	.66	.58
IN.	.56	1.08	1.48	.93	.95	1.33	2.19	2.12	1.12	.84	.76	.64

CAL YR 1982 TOTAL 317492 MEAN 870 MAX 4870 MIN 330 CFSM 1.06 IN 14.33
WTR YR 1983 TOTAL 309708 MEAN 849 MAX 2430 MIN 255 CFSM 1.03 IN 13.98

04105700 AUGUSTA CREEK NEAR AUGUSTA, MI

LOCATION.--Lat 42°21'12", long 85°21'14", in SW1/4 sec.27, T.1 S., R.9 W., Kalamazoo County, Hydrologic Unit 04050003, on left bank 15 ft downstream from bridge on EF Road, and 1.3 mi north of Augusta.

DRAINAGE AREA.--38.9 mi^2.

PERIOD OF RECORD.--October 1964 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 815 ft from topographic map. Prior to June 15, 1965, nonrecording gage at same site and datum.

REMARKS.--Records good. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--19 years, 43.2 ft^3/s, 15.08 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 560 ft^3/s June 27, 1978, gage height, 3.41 ft; minimum, 8.9 ft^3/s Jan. 26, 1978, result of freezeup; minimum gage height, 0.65 ft Jan. 19, 1970.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 111 ft^3/s May 2, gage height, 2.09 ft; minimum, 19 ft^3/s Feb. 11, result of freezeup; minimum gage height, 0.81 ft Sept. 5.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	31	39	47	53	37	43	62	65	56	39	36	25
2	32	53	46	51	41	43	68	101	52	37	34	25
3	29	55	70	48	50	43	77	103	54	35	32	24
4	28	50	85	45	43	45	73	91	59	34	32	23
5	26	45	87	46	38	47	66	76	57	32	32	22
6	26	42	85	44	39	49	62	68	55	30	29	28
7	26	39	79	44	37	56	64	69	53	29	28	28
8	26	38	70	43	36	67	62	77	50	28	27	27
9	27	42	62	43	36	66	63	73	48	28	25	25
10	29	49	56	44	35	60	72	65	47	29	25	25
11	33	48	54	48	33	55	72	59	45	28	75	26
12	33	52	51	46	33	51	67	55	43	27	57	26
13	29	51	50	44	38	48	67	52	42	25	48	25
14	29	48	47	42	39	48	85	50	42	25	42	24
15	29	47	49	41	41	45	87	50	37	25	38	24
16	34	44	57	36	42	44	80	48	36	23	35	32
17	34	41	55	37	46	43	72	47	33	23	34	33
18	33	39	51	31	46	47	67	45	32	23	34	33
19	32	39	51	34	47	58	63	60	32	23	32	49
20	35	59	51	34	50	58	59	69	35	22	29	51
21	36	64	49	33	50	55	57	63	35	25	27	67
22	35	58	48	34	52	55	58	67	34	55	32	67
23	33	54	53	37	57	53	57	69	33	55	31	62
24	33	53	69	37	55	52	54	61	32	46	29	55
25	33	49	86	37	50	50	50	53	30	39	28	48
26	32	46	91	36	46	50	44	48	29	35	28	43
27	32	44	82	33	45	54	43	52	31	33	27	40
28	32	45	74	35	43	72	53	48	43	32	27	38
29	32	51	67	33	---	74	62	53	46	36	26	36
30	32	50	61	39	---	69	62	60	42	36	25	34
31	32	---	55	39	---	65	---	59	---	37	26	---
TOTAL	963	1434	1938	1247	1205	1665	1928	1956	1263	994	1030	1065
MEAN	31.1	47.8	62.5	40.2	43.0	53.7	64.3	63.1	42.1	32.1	33.2	35.5
MAX	36	64	91	53	57	74	87	103	59	55	75	67
MIN	26	38	46	31	33	43	43	45	29	22	25	22
CFSM	.80	1.23	1.61	1.03	1.11	1.38	1.65	1.62	1.08	.83	.85	.91
IN.	.92	1.37	1.85	1.19	1.15	1.59	1.84	1.87	1.21	.95	.98	1.02

CAL YR 1982 TOTAL 16857 MEAN 46.2 MAX 127 MIN 22 CFSM 1.19 IN 16.12
WTR YR 1983 TOTAL 16688 MEAN 45.7 MAX 103 MIN 22 CFSM 1.18 IN 15.96

04106180 PORTAGE CREEK AT PORTAGE, MI

LOCATION.--Lat 42°12'21", long 85°35'23", in SE1/4 sec.16, T.3 S., R.11 W., Kalamazoo County, Hydrologic Unit 04050003, on right bank 750 ft upstream from bridge on Westnedge Avenue in Portage.

DRAINAGE AREA.--16.5 mi^2.

PERIOD OF RECORD.--October 1982 to September 1983.

GAGE.--Water-stage recorder. Altitude of gage is 850 ft from topographic map.

REMARKS.--Records good. Several observations of water temperature were made during the year.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 52 ft^3/s May 1, gage height, 3.11 ft; minimum, 13 ft^3/s Sept. 5, 10, 13, 14; minimum gage height, 1.83 ft Sept. 14.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	15	19	18	20	18	17	20	29	21	20	16	14
2	14	23	20	20	22	17	27	45	20	20	16	15
3	14	22	35	19	21	17	27	31	21	18	15	14
4	14	18	33	19	19	17	23	26	21	18	24	14
5	15	16	32	19	19	17	21	24	20	17	19	14
6	15	16	30	19	19	18	22	23	20	17	17	16
7	16	15	25	19	19	20	24	24	20	16	16	15
8	16	15	23	19	18	21	22	26	19	16	16	15
9	17	18	21	19	18	19	24	23	19	16	15	15
10	16	19	20	19	18	19	25	22	18	16	17	14
11	16	19	20	20	18	18	24	21	18	16	23	15
12	16	24	19	19	18	18	22	21	18	16	18	14
13	16	22	19	19	18	17	26	21	17	15	17	14
14	16	19	19	19	18	17	38	21	17	15	16	14
15	16	17	21	18	18	17	29	21	17	15	16	14
16	15	17	23	18	19	17	25	21	17	15	15	15
17	15	16	21	18	20	17	24	21	17	15	16	15
18	15	16	20	17	20	18	22	21	16	16	16	16
19	15	16	20	17	20	21	22	27	17	15	16	22
20	16	26	20	17	19	19	21	24	16	16	15	20
21	15	25	19	17	19	20	21	22	16	16	15	22
22	14	20	19	17	20	19	20	29	16	16	16	21
23	14	20	19	18	20	19	20	26	16	16	16	21
24	14	19	21	18	19	19	20	23	16	15	15	19
25	15	17	30	18	18	18	20	22	16	15	15	17
26	16	17	25	17	18	18	20	21	15	15	15	17
27	16	16	22	17	17	24	19	20	18	15	15	17
28	15	18	23	17	17	35	24	21	23	15	15	16
29	15	21	21	17	---	27	23	24	20	15	15	16
30	16	19	20	19	---	23	27	25	18	16	15	16
31	15	---	20	18	---	22	---	23	---	17	15	---
TOTAL	473	565	698	567	527	605	702	748	543	499	506	487
MEAN	15.3	18.8	22.5	18.3	18.8	19.5	23.4	24.1	18.1	16.1	16.3	16.2
MAX	17	26	35	20	22	35	38	45	23	20	24	22
MIN	14	15	18	17	17	17	19	20	15	15	15	14
CFSM	.93	1.14	1.36	1.11	1.14	1.18	1.42	1.46	1.10	.98	.99	.98
IN.	1.07	1.27	1.57	1.28	1.19	1.36	1.58	1.69	1.22	1.12	1.14	1.10

WTR YR 1983 TOTAL 6920 MEAN 19.0 MAX 45 MIN 14 CFSM 1.15 IN 15.60

04106300 PORTAGE CREEK NEAR KALAMAZOO, MI

LOCATION.--Lat 42°14'46", long 85°34'33", in SE1/4 sec.34, T.2 S., R.11 W., Kalamazoo County, Hydrologic Unit 04050003, on left bank 25 ft upstream from bridge on Lovers Lane, and 3.0 mi south of Kalamazoo.

DRAINAGE AREA.--22.4 mi².

PERIOD OF RECORD.--October 1964 to current year.

GAGE.--Water-stage recorder. Datum of gage is 814.88 ft National Geodetic Vertical Datum of 1929.

REMARKS.--Records fair. Flow includes water which is pumped from ground-water sources by industry and discharged into stream 2.0 mi upstream from station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--19 years, 40.5 ft³/s, 24.55 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 290 ft³/s June 26, 1978, gage height, 4.49 ft; minimum, 8.0 ft³/s Jan. 19, 1965, gage height, 0.88 ft, result of bridge construction upstream.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 100 ft³/s and maximum (*):

Date	Time	Discharge (ft³/s)	Gage height (ft)	Date	Time	Discharge (ft³/s)	Gage height (ft)
Dec. 3	0700	110	1.88	May 19	1400	113	1.85
Mar. 28	0100	120	1.89	May 22	1100	108	1.82
Apr. 13	2400	110	1.83	Aug. 11	0500	108	2.01
May 2	0400	*181	*2.22	Sept.19	0400	108	2.05

Minimum discharge, 21 ft³/s Oct. 23; minimum gage height, 1.32 ft Nov. 19, 25, 27.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	32	44	31	36	40	43	45	55	54	44	36	30
2	29	55	36	36	54	44	64	117	53	38	34	30
3	29	43	71	37	45	44	54	58	55	36	33	29
4	31	32	47	37	43	44	53	50	51	33	51	29
5	31	31	53	38	38	41	51	47	48	34	41	28
6	33	28	45	37	37	44	54	48	51	34	33	34
7	34	26	38	40	40	53	58	54	51	34	32	32
8	32	27	37	36	40	50	50	54	48	37	34	31
9	31	38	34	34	40	43	50	48	47	34	34	30
10	28	33	36	41	40	41	47	47	47	34	33	28
11	32	41	32	43	37	41	47	45	43	37	64	31
12	32	45	31	40	34	38	45	47	43	36	34	29
13	29	36	32	40	33	38	60	45	44	34	31	28
14	31	31	33	38	38	41	88	45	43	33	28	27
15	28	31	38	36	38	40	57	43	43	33	29	29
16	27	31	43	34	40	40	47	44	43	33	33	35
17	26	29	38	36	43	40	45	44	43	36	36	29
18	27	27	34	36	41	43	43	44	38	37	36	37
19	28	28	34	36	40	48	43	66	37	38	37	65
20	36	55	38	34	40	37	43	53	38	38	36	53
21	29	40	40	37	45	41	43	45	38	43	32	52
22	27	32	38	36	47	43	41	64	34	43	31	48
23	22	36	38	37	48	43	41	55	34	32	31	47
24	24	34	40	37	45	41	40	53	33	29	30	40
25	28	28	61	38	43	40	41	53	33	32	30	37
26	27	28	41	40	40	38	41	50	32	32	30	38
27	27	27	38	37	38	55	41	50	40	32	30	37
28	28	34	44	38	41	85	55	48	58	33	30	36
29	32	37	40	37	---	54	45	63	40	34	30	36
30	29	32	38	41	---	50	54	57	37	37	30	36
31	28	---	37	40	---	47	---	58	---	37	30	---
TOTAL	907	1039	1236	1163	1148	1390	1486	1650	1299	1097	1059	1071
MEAN	29.3	34.6	39.9	37.5	41.0	44.8	49.5	53.2	43.3	35.4	34.2	35.7
MAX	36	55	71	43	54	85	88	117	58	44	64	65
MIN	22	26	31	34	33	37	40	43	32	29	28	27

CAL YR 1982	TOTAL	15556	MEAN 42.6	MAX 175	MIN 22
WTR YR 1983	TOTAL	14545	MEAN 39.8	MAX 117	MIN 22

04106320 WEST FORK PORTAGE CREEK NEAR OSHTEMO, MI

LOCATION.--Lat 42°14'07", long 85°38'54", in SE1/4 sec.1, T.3 S., R.12 W., Kalamazoo County, Hydrologic Unit 04050003, on right bank at upstream side of culvert on 12th Street, 2.1 mi southeast of Oshtemo.

DRAINAGE AREA.--13.8 mi^2.

PERIOD OF RECORD.--May 1972 to current year.

GAGE.--Water-stage recorder. Datum of gage is 868.86 ft Kalamazoo County Road Commission datum.

REMARKS.--Records good. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--11 years, 7.23 ft^3/s, 7.55 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 26 ft^3/s Aug. 31, 1975, gage height, 2.15 ft; minimum, 1.9 ft^3/s July 16, 17, 18, 22, 23, 24, 25, 1981, gage height, 1.06 ft.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 13 ft^3/s Dec. 5, 6, gage height, 1.72 ft; minimum, 2.5 ft^3/s July 16, 18, 19, 21, gage height, 1.12 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4.1	6.1	7.4	7.0	6.4	5.7	7.7	6.7	7.3	5.4	3.7	3.5
2	4.1	8.2	7.5	6.9	7.1	5.7	8.3	10	6.8	5.6	3.6	3.4
3	4.2	8.6	11	6.9	7.9	5.7	9.3	10	7.0	5.2	3.5	3.2
4	4.2	7.9	12	6.8	7.4	5.7	8.8	8.8	7.5	4.8	4.4	3.1
5	4.3	7.3	13	6.8	6.9	5.6	7.9	7.5	6.9	4.6	4.6	3.0
6	4.3	6.7	13	6.8	6.8	5.8	7.5	6.8	6.7	4.3	4.6	3.2
7	4.5	6.2	12	6.9	6.6	6.7	7.8	7.1	6.3	3.6	4.4	3.2
8	4.5	5.9	11	6.7	6.3	7.5	7.5	7.6	5.8	3.6	4.1	3.2
9	4.6	6.2	9.6	6.6	6.2	7.5	7.3	7.2	5.6	3.6	3.8	3.3
10	5.0	7.0	8.9	6.9	6.1	7.1	7.7	6.4	5.4	3.6	3.7	3.3
11	5.0	7.3	8.4	7.2	5.8	6.8	7.4	5.9	5.2	3.5	5.7	3.4
12	4.9	8.2	8.2	7.0	5.8	6.7	7.0	5.5	5.0	3.5	5.8	3.3
13	4.8	8.1	8.1	6.8	5.7	6.6	7.8	5.3	4.8	3.3	5.5	3.2
14	4.9	7.5	7.9	6.6	5.7	6.5	10	5.2	4.5	3.0	5.1	3.1
15	4.8	7.0	8.1	6.5	5.8	6.2	10	5.1	4.5	3.0	4.7	3.1
16	4.7	6.6	8.6	6.3	6.0	6.0	9.2	5.0	4.3	2.9	4.2	3.7
17	4.7	6.2	8.4	6.2	6.4	6.0	8.5	4.8	4.1	2.9	4.2	4.1
18	4.8	5.9	8.2	5.9	6.4	6.6	7.9	4.7	3.9	2.8	4.1	4.3
19	4.9	6.1	7.9	5.7	6.4	8.0	7.5	5.9	3.8	2.8	3.9	5.9
20	5.5	7.9	7.8	5.5	6.4	8.0	7.0	7.4	3.7	2.9	3.8	6.9
21	5.5	9.1	7.5	5.5	6.4	8.1	6.5	7.3	3.6	2.8	3.6	8.7
22	5.4	8.7	7.2	5.8	6.5	8.3	6.0	7.9	3.5	3.2	3.7	8.5
23	5.2	8.4	7.3	6.3	6.6	8.3	5.6	8.4	3.4	3.2	3.5	8.3
24	5.2	8.4	7.8	6.5	6.5	7.9	5.9	7.7	3.3	3.2	3.4	7.5
25	5.2	7.8	9.5	6.4	6.2	7.5	6.9	6.9	3.2	3.1	3.3	6.7
26	5.2	7.5	9.7	6.3	5.9	7.2	5.9	6.4	3.1	3.1	3.3	6.2
27	5.2	7.1	9.0	6.1	5.8	7.8	5.6	6.0	3.4	3.0	3.2	5.8
28	5.1	7.1	9.2	6.0	5.7	10	6.0	5.8	5.7	2.8	3.2	5.4
29	5.1	7.8	8.4	6.0	---	10	6.6	6.7	5.7	2.9	3.1	5.1
30	5.0	7.7	7.6	6.6	---	9.4	6.7	8.0	5.5	3.1	3.1	4.9
31	5.1	---	7.2	6.6	---	8.5	---	8.0	---	3.8	3.1	---
TOTAL	150.0	220.5	277.4	200.1	177.7	223.4	223.8	212.0	149.5	109.1	123.9	140.5
MEAN	4.84	7.35	8.95	6.45	6.35	7.21	7.46	6.84	4.98	3.52	4.00	4.68
MAX	5.5	9.1	13	7.2	7.9	10	10	10	7.5	5.6	5.8	8.7
MIN	4.1	5.9	7.2	5.5	5.7	5.6	5.6	4.7	3.1	2.8	3.1	3.0
CFSM	.37	.57	.69	.50	.49	.56	.57	.53	.38	.27	.31	.36
IN.	.43	.63	.79	.57	.51	.64	.64	.61	.43	.31	.35	.40

CAL YR 1982 TOTAL 2095.1 MEAN 5.74 MAX 13 MIN 2.9 CFSM .44 IN 5.99
WTR YR 1983 TOTAL 2207.9 MEAN 6.05 MAX 13 MIN 2.8 CFSM .47 IN 6.32

04106400 WEST FORK PORTAGE CREEK AT KALAMAZOO, MI

LOCATION.--Lat 42°14'40", long 85°36'50", in NE1/4 sec.5, T.3 S., R.11 W., Kalamazoo County, Hydrologic Unit 04050003, on right bank 30 ft upstream from culvert on Oakland Drive, 2.5 mi upstream from mouth, and 3.7 mi southwest of main business district of Kalamazoo.

DRAINAGE AREA.--18.7 mi^2.

PERIOD OF RECORD.--September 1959 to current year.

GAGE.--Water-stage recorder and V-notch sharp-crested weir. Datum of gage is 858.09 ft National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources).

REMARKS.--Records good. At times, flow is affected by ground-water withdrawals. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--24 years, 9.94 ft^3/s, 7.22 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 41 ft^3/s Apr. 19, 1975, gage height, 3.32 ft; minimum, 1.0 ft^3/s Aug. 9, 1964; minimum gage height, 0.88 ft July 30, 1963, caused by construction.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 32 ft^3/s May 2, gage height, 3.07 ft; minimum, 4.5 ft^3/s July 28, 29, gage height, 2.35 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	7.5	10	12	12	11	9.4	12	16	13	8.9	6.5	5.4
2	7.5	13	13	12	12	9.2	14	29	12	9.2	6.3	5.4
3	7.5	14	20	11	13	9.0	15	24	13	8.9	6.0	5.4
4	7.4	14	22	11	13	8.9	14	21	14	8.4	6.8	5.1
5	7.4	13	23	11	12	8.8	13	18	14	7.8	6.5	5.1
6	7.5	12	23	11	12	9.2	12	15	12	7.3	6.3	5.8
7	7.8	11	21	11	11	11	13	15	12	6.5	6.0	5.8
8	7.8	11	19	11	11	12	12	16	12	6.3	5.6	5.8
9	8.0	11	17	11	11	12	12	15	12	6.3	5.4	5.6
10	8.4	12	15	11	11	12	13	13	12	6.0	5.4	5.4
11	8.4	12	13	11	10	11	13	12	12	5.8	10	5.6
12	8.4	14	12	11	10	10	12	11	11	5.6	9.8	5.6
13	8.4	14	12	11	10	10	13	10	10	5.4	8.9	5.4
14	8.4	13	12	11	10	9.6	19	10	9.8	5.1	8.1	5.4
15	8.4	12	12	11	10	9.1	17	9.7	9.2	4.9	7.8	5.4
16	8.4	12	13	10	10	8.8	15	9.1	8.9	4.9	7.3	6.5
17	8.2	11	13	10	11	8.6	14	8.6	8.6	4.9	7.3	7.0
18	8.4	11	12	9.8	11	9.5	13	8.6	8.1	5.1	7.5	6.8
19	8.4	11	12	9.7	11	12	12	11	7.5	5.1	6.8	9.2
20	8.9	15	12	9.5	11	12	11	13	7.3	5.1	6.5	10
21	9.2	17	11	9.4	11	13	10	13	7.0	5.1	6.0	14
22	9.2	16	11	9.5	11	13	9.8	14	7.0	5.6	6.8	14
23	9.2	16	11	10	11	12	9.3	17	6.8	5.6	6.5	14
24	8.9	16	12	10	11	12	8.9	15	6.5	5.4	6.0	13
25	8.9	15	15	10	11	11	8.2	13	6.3	5.1	5.8	12
26	8.7	14	16	10	10	11	8.5	12	6.0	4.9	5.8	11
27	8.6	13	16	10	9.8	12	12	11	5.8	4.9	5.8	10
28	8.6	13	17	9.9	9.5	18	14	10	9.5	4.7	5.8	9.5
29	8.6	13	16	9.8	---	17	15	11	10	4.5	5.6	8.9
30	8.6	13	14	11	---	15	15	13	9.5	4.9	5.4	8.6
31	8.6	---	13	11	---	14	---	13	---	6.5	5.6	---
TOTAL	258.2	392	460	326.6	305.3	350.1	379.7	427.0	292.8	184.7	205.9	236.7
MEAN	8.33	13.1	14.8	10.5	10.9	11.3	12.7	13.8	9.76	5.96	6.64	7.89
MAX	9.2	17	23	12	13	18	19	29	14	9.2	10	14
MIN	7.4	10	11	9.4	9.5	8.6	8.2	8.6	5.8	4.5	5.4	5.1
CFSM	.45	.70	.79	.56	.58	.60	.68	.74	.52	.32	.36	.42
IN.	.51	.78	.92	.65	.61	.70	.76	.85	.58	.37	.41	.47

CAL YR 1982 TOTAL 3712.4 MEAN 10.2 MAX 32 MIN 6.0 CFSM .55 IN 7.38
WTR YR 1983 TOTAL 3819.0 MEAN 10.5 MAX 29 MIN 4.5 CFSM .56 IN 7.60

04106500 PORTAGE CREEK AT KALAMAZOO, MI

LOCATION.--Lat 42°16'27", long 85°34'35", in NW1/4 NE1/4 sec.27, T.2 S., R.11 W., Kalamazoo County, Hydrologic Unit 04050003, on left bank 50 ft upstream from bridge on Reed Avenue in Kalamazoo, and 1.5 mi upstream from mouth.

DRAINAGE AREA.--46.8 mi^2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1947 to September 1958, June 1975 to current year. Monthly discharge only for some periods, published in WSP 1307.

GAGE.--Water-stage recorder. Datum of gage is 761.50 ft National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Dec. 15, 1947, to Dec. 7, 1955, nonrecording gage at same site and datum.

REMARKS.--Water-discharge records good. Some regulation by millponds upstream from station. Flow includes water which is pumped from ground-water sources by industry and discharged into stream 5.0 mi upstream from station.

AVERAGE DISCHARGE.--19 years, 54.2 ft^3/s, 15.73 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 580 ft^3/s sometime in July 1954, from rating curve extended above 165 ft^3/s, gage height, 5.25 ft caused by momentary gate opening of millpond; maximum gage height, 5.44 ft June 26, 1978; minimum discharge, 2.0 ft^3/s May 8, 1956, gage height, 1.50 ft; minimum gage height, 1.41 ft May 12, 13, 1980, Aug. 16, 1981.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 181 ft^3/s May 2, gage height, 3.74 ft; minimum, 4.1 ft^3/s Oct. 18, gage height, 1.46 ft; minimum daily, 34 ft^3/s Sept. 14.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	42	58	48	47	53	51	58	72	66	54	41	38
2	39	79	54	46	74	51	81	154	65	52	39	38
3	39	64	106	46	54	52	77	94	71	49	39	36
4	40	50	98	46	51	52	64	68	67	47	59	36
5	41	47	86	47	48	51	63	61	62	44	47	35
6	42	46	80	47	49	52	65	61	66	45	41	43
7	45	43	64	47	49	63	71	70	64	43	39	40
8	43	42	57	46	50	66	62	76	62	44	38	39
9	47	56	54	43	49	54	63	61	60	43	39	38
10	44	51	52	50	47	53	62	58	59	42	41	35
11	44	57	48	52	46	52	57	56	56	42	101	39
12	44	68	43	51	44	50	55	55	54	42	47	35
13	44	54	46	50	47	49	68	54	55	41	41	35
14	45	46	46	48	50	50	104	54	54	40	39	34
15	44	45	52	46	51	49	90	52	55	39	39	36
16	42	44	60	44	53	49	64	52	56	39	40	44
17	41	43	54	44	51	48	58	50	53	44	46	36
18	42	42	51	44	50	53	55	50	49	42	43	40
19	41	42	49	43	50	64	54	82	46	43	42	82
20	52	85	51	43	52	50	52	68	48	42	40	55
21	44	62	53	43	55	53	54	57	48	48	39	70
22	42	51	51	44	57	57	51	85	43	53	42	56
23	39	55	52	48	54	55	51	70	44	39	40	54
24	38	55	54	48	51	53	48	65	42	37	36	48
25	39	48	91	48	50	51	51	65	42	36	39	45
26	41	46	70	47	48	50	49	59	40	38	38	44
27	39	45	58	45	49	61	50	59	48	37	39	44
28	40	54	65	47	51	116	71	57	87	37	37	42
29	39	56	55	50	---	82	60	79	54	38	38	42
30	39	50	51	50	---	65	69	73	48	42	38	42
31	40	---	49	48	---	60	---	68	---	46	39	---
TOTAL	1301	1584	1848	1448	1433	1762	1877	2085	1664	1328	1326	1301
MEAN	42.0	52.8	59.6	46.7	51.2	56.8	62.6	67.3	55.5	42.8	42.8	43.4
MAX	52	85	106	52	74	116	104	154	87	54	101	82
MIN	38	42	43	43	44	48	48	50	40	36	36	34

CAL YR 1982 TOTAL 20348 MEAN 55.7 MAX 261 MIN 35
WTR YR 1983 TOTAL 18957 MEAN 51.9 MAX 154 MIN 34

04106500 PORTAGE CREEK AT KALAMAZOO, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: April 1972 to August 1974, August 1975 to current year.

INSTRUMENTATION.--Temperature recorder April 1972 to August 1974, August 1975 to current year.

REMARKS.--Interruptions in the record were due to malfunctions of the instrument.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum, 32.5°C Mar. 4, 1981; minimum, 0.0°C Dec. 31, 1976, Jan. 1, 2, 1977.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum, 27.5°C July 16.

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	19.5	16.0	18.0	14.0	12.0	13.0				---	---	---
2	19.0	16.0	18.0	13.5	13.0	13.5				---	---	---
3	19.0	16.5	18.0	13.0	9.5	11.5				---	---	---
4	17.5	14.0	16.5	9.5	6.0	8.0				---	---	---
5	18.5	15.0	16.5	6.0	5.0	5.5				---	---	---
6	19.5	16.0	18.0	6.0	5.0	5.5				---	---	---
7	19.0	17.5	18.0	8.0	5.0	6.0				---	---	---
8	17.5	13.5	16.0	11.0	8.0	9.5				---	---	---
9	17.0	14.5	15.0	10.0	7.5	8.5				---	---	---
10	18.0	14.5	16.0	9.5	6.5	8.0				---	---	---
11	16.0	13.5	14.0	11.0	9.0	10.5				---	---	---
12	13.5	12.5	13.0	11.0	8.0	10.0				---	---	---
13	13.0	12.0	12.0	7.5	5.0	6.0				---	---	---
14	12.5	11.5	12.0	5.0	4.0	4.0				---	---	---
15	13.5	11.0	12.0	5.0	2.5	4.0				---	---	---
16	12.0	10.0	10.5	---	---	---				---	---	---
17	9.5	8.5	9.0	---	---	---				---	---	---
18	13.0	9.0	11.0	---	---	---				---	---	---
19	13.5	11.0	12.0	---	---	---				---	---	---
20	13.0	9.5	11.5	---	---	---				---	---	---
21	9.5	9.0	9.0	---	---	---				---	---	---
22	9.5	9.0	9.0	---	---	---				---	---	---
23	9.5	7.0	8.5	---	---	---				---	---	---
24	9.5	6.5	8.0	---	---	---				---	---	---
25	10.0	6.5	8.5	---	---	---				---	---	---
26	11.0	7.5	9.5	---	---	---				---	---	---
27	11.0	8.0	10.0	---	---	---				6.0	5.0	5.5
28	13.5	10.0	11.5	---	---	---				7.0	5.0	6.0
29	13.0	11.5	12.0	---	---	---				7.5	6.0	6.5
30	11.5	9.5	10.5	---	---	---				7.5	6.0	6.5
31	12.5	11.0	11.5	---	---	---				6.0	5.5	5.5
MONTH	19.5	6.5	12.5									

04106500 PORTAGE CREEK AT KALAMAZOO, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	6.0	5.5	6.0	11.0	8.0	9.5	11.5	10.0	10.5	13.0	11.0	12.5
2	6.0	5.0	5.5	12.0	8.5	10.5	10.0	7.5	8.0	13.5	11.0	12.0
3	6.0	4.5	5.5	13.5	10.0	11.5	10.0	7.5	8.5	13.0	11.0	11.5
4	5.0	4.0	4.5	13.5	12.0	13.0	10.5	8.5	9.5	15.5	9.5	12.0
5	5.5	4.0	5.0	15.5	12.5	14.0	10.0	9.5	10.0	17.0	11.0	14.0
6	5.5	4.5	5.0	15.0	12.5	13.5	10.0	9.0	9.5	16.0	12.5	14.5
7	7.0	4.5	5.5	14.5	12.0	13.5	11.5	10.0	10.5	17.0	14.0	15.0
8	6.5	5.0	5.5	13.5	10.0	11.5	13.5	9.0	11.0	17.0	10.5	14.0
9	6.0	5.5	5.5	10.0	8.0	8.5	11.5	7.5	8.5	17.5	11.0	14.5
10	6.0	5.0	5.5	8.0	7.5	8.0	9.5	7.5	8.5	18.5	12.5	15.5
11	5.5	4.0	5.0	7.5	7.0	7.5	9.5	7.5	8.5	19.0	13.0	16.5
12	6.0	4.0	5.0	10.5	6.0	8.0	13.0	7.0	10.0	18.5	14.5	16.5
13	6.5	4.0	5.0	11.0	7.0	9.0	11.5	9.5	10.5	19.5	15.0	17.5
14	7.5	4.0	6.0	11.5	10.0	10.5	13.5	10.5	11.5	18.0	16.0	16.5
15	7.0	6.5	6.5	12.0	8.0	10.0	11.5	9.0	9.5	17.5	13.0	15.5
16	7.0	6.5	6.5	13.0	9.5	11.0	12.5	7.5	10.0	17.0	12.5	15.0
17	7.0	6.0	6.5	13.5	7.5	11.5	10.0	7.0	9.0	18.5	10.5	15.0
18	7.5	6.5	7.0	12.0	10.0	10.5	8.5	6.0	7.0	16.5	12.5	15.0
19	8.5	6.5	7.5	10.0	7.5	9.0	9.0	6.0	7.5	16.5	14.0	15.0
20	10.0	7.0	8.5	7.0	3.5	6.0	12.5	6.5	9.5	16.0	14.0	15.0
21	11.5	8.5	9.5	4.5	1.5	3.0	15.0	9.0	11.5	18.5	13.0	16.0
22	11.0	9.5	10.0	7.0	4.0	5.5	16.0	11.5	13.5	18.0	15.5	16.5
23	10.5	8.0	9.5	8.0	5.0	6.5	17.5	11.5	14.5	17.0	14.5	16.0
24	9.5	6.0	7.5	8.5	5.0	7.0	15.5	11.5	13.5	20.5	13.5	17.0
25	6.5	4.5	5.5	9.5	5.0	7.0	16.5	11.0	13.5	19.0	15.5	17.5
26	8.0	5.0	6.5	9.5	6.0	8.0	17.5	12.5	15.0	18.0	12.5	15.5
27	8.5	5.5	7.5	9.5	7.0	8.0	20.0	14.0	17.0	18.0	12.5	15.5
28	10.5	7.5	8.5	8.0	5.5	6.0	18.0	11.0	14.0	17.0	15.0	16.0
29	---	---	---	9.5	4.5	7.0	16.5	11.0	13.5	19.0	14.5	16.5
30	---	---	---	10.5	6.5	8.5	15.5	13.0	14.0	16.5	13.5	14.5
31	---	---	---	12.0	7.5	10.0	---	---	---	17.0	13.0	14.5
MONTH	11.5	4.0	6.5	15.5	1.5	9.0	20.0	6.0	11.0	20.5	9.5	15.0

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	17.5	13.5	15.5	22.5	19.5	21.0	24.5	21.0	23.0	23.0	19.0	21.0
2	16.5	14.0	15.5	24.0	19.5	21.5	25.0	19.5	22.5	23.0	18.0	20.5
3	15.5	13.0	14.5	25.5	20.5	23.0	24.0	20.5	22.5	23.5	19.0	21.5
4	16.5	14.5	15.5	23.5	21.0	22.0	24.0	21.5	23.0	23.0	19.0	21.5
5	21.0	14.5	17.0	21.5	18.0	20.0	25.0	21.5	23.5	23.5	20.0	22.0
6	18.5	16.0	17.0	22.0	15.5	19.0	25.0	21.5	23.5	22.5	21.0	22.0
7	20.0	14.5	17.0	21.5	16.5	18.5	26.0	21.5	23.5	22.0	18.0	20.0
8	21.5	14.5	18.0	21.5	18.5	19.5	26.5	21.0	23.5	22.0	17.0	20.0
9	22.0	16.5	19.0	23.5	19.0	20.0	24.5	20.5	23.0	23.5	18.5	21.0
10	24.0	18.5	21.0	22.5	20.0	21.0	23.0	20.5	21.5	24.5	20.5	22.5
11	24.5	19.0	21.5	26.0	19.5	22.5	22.0	20.5	21.0	23.5	20.5	22.0
12	24.5	19.0	22.0	23.5	20.0	21.5	23.5	18.0	20.5	20.5	17.5	19.0
13	24.5	19.5	22.0	26.0	20.0	22.5	24.0	19.0	21.5	19.5	17.0	18.5
14	24.5	20.0	22.0	27.0	21.5	24.0	23.5	19.0	21.5	19.0	15.0	17.5
15	24.0	19.5	21.5	26.5	22.5	24.5	---	---	---	17.5	15.0	16.0
16	23.5	18.5	21.0	27.5	22.5	24.5	---	---	---	17.0	15.0	16.0
17	23.5	18.0	21.0	26.0	22.0	23.5	---	---	---	19.0	14.5	17.0
18	24.0	18.0	21.0	25.0	22.0	23.5	---	---	---	22.5	17.0	19.5
19	23.5	18.5	21.0	25.0	22.0	23.5	27.0	21.5	24.0	22.5	20.5	21.5
20	24.0	18.5	21.5	25.5	22.5	23.5	26.0	22.5	24.5	21.5	18.0	19.5
21	25.5	19.0	22.5	26.5	22.0	24.0	25.0	20.5	23.0	17.5	15.0	16.5
22	25.5	19.5	22.5	24.5	22.5	23.0	23.5	21.5	22.5	14.5	12.5	13.5
23	26.0	20.5	23.0	24.0	22.0	23.0	23.5	19.5	22.0	14.5	12.0	13.0
24	25.5	20.5	23.0	25.5	21.0	23.0	24.0	19.5	22.0	16.0	11.0	13.5
25	25.5	20.0	23.0	24.5	21.5	22.5	23.0	20.0	22.0	14.5	13.0	13.5
26	25.0	21.0	23.0	24.0	20.5	22.5	24.0	20.5	22.5	15.5	13.5	14.5
27	23.5	21.5	22.5	24.0	20.0	22.0	24.5	20.5	22.5	18.5	13.5	16.0
28	21.5	18.0	19.5	25.0	21.0	22.5	25.0	21.5	23.5	19.0	15.0	17.5
29	20.0	17.0	18.5	26.0	23.0	23.5	25.5	21.0	23.0	19.5	16.0	17.0
30	23.0	18.0	20.0	24.0	22.5	23.0	23.5	21.0	22.0	19.0	15.5	17.5
31	---	---	---	24.5	22.5	23.0	22.5	19.5	21.0	---	---	---
MONTH	26.0	13.0	20.0	27.5	15.5	22.5				24.5	11.0	18.5

04108500 KALAMAZOO RIVER NEAR FENNVILLE, MI

LOCATION.--Lat 42°35'36", long 85°59'03", in NE1/4 sec.5, T.2 N., R.14 W., Allegan County, Hydrologic Unit 04050003, on left bank 40 ft upstream from bridge on State Highway 89, 2.1 mi downstream from Swan Creek, 4.0 mi downstream from Calkins Dam, and 6.1 mi east of Fennville.

DRAINAGE AREA.--1,600 mi^2, approximately.

PERIOD OF RECORD.--April 1929 to September 1936, October 1937 to current year. Monthly discharge only for some periods, published in WSP 1307. Published as "near Allegan" April 1929 to September 1932; as "at Calkins Bridge, near Allegan" October 1932 to September 1936, October 1937 to September 1938; as "at Calkins Dam, near Allgan" October 1938 to September 1950.

REVISED RECORDS.--WSP 1387: 1929(M), 1930, 1933, 1934-36(M), 1938(M), 1939-40, 1942.

GAGE.--Water-stage recorder. Datum of gage is 586.51 ft National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). April 1929 to September 1936 at bridge and October 1937 to September 1950 in powerplant, 4.0 mi upstream at NGVD (levels by city of Allegan).

REMARKS.--Records good. Flow regulated at low and medium stages by powerplants upstream from station and since June 1936 by Calkins Dam and powerplant, 4.0 mi upstream from station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--53 years, 1,419 ft^3/s, 12.04 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 17,500 ft^3/s Apr. 11, 1947, gage height, 606.76 ft, site and datum then in use; minimum daily, 50 ft^3/s Aug. 19, 1976, caused by shutting off flow at Calkins Dam.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 4,430 ft^3/s Dec. 4, gage height, 11.79 ft; minimum daily, 696 ft^3/s Aug. 11.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1150	1380	2010	2490	1830	1870	2770	2390	2380	1800	1320	764
2	1200	1350	2020	2450	1340	1870	3170	3310	2370	1880	1590	911
3	1300	1280	2590	2440	1470	1860	3270	4230	2370	1220	1800	1070
4	1200	1580	4190	2410	1990	1820	3420	3820	2280	1130	1800	1030
5	1160	1730	3810	2170	1900	1590	3260	3580	2270	1710	1650	1020
6	1070	1340	3610	2040	1890	1280	3150	4080	2340	1220	1130	1060
7	1080	1270	3500	1980	1880	1860	2930	3770	2130	883	1310	1090
8	1040	1340	3200	1940	1840	1860	2850	3650	1960	1290	1710	995
9	783	1850	3000	1920	1850	1860	3070	3430	1950	1150	1540	911
10	784	1810	2800	1540	1690	1890	3060	3360	1950	1150	746	967
11	782	1560	2700	1590	1540	1910	3030	3340	1940	1140	696	1010
12	1020	1560	2500	2010	1440	1930	3020	3350	1930	1140	925	1080
13	1200	1880	2400	1620	1320	1970	3040	2540	1520	1140	967	1150
14	1030	1810	2220	1880	1740	1970	3510	2730	1230	1140	1290	830
15	803	1810	2020	1860	1610	1930	4320	2430	1400	1140	1530	813
16	805	1790	1970	1810	1200	1870	4260	2390	1600	1130	1580	823
17	805	1640	1870	1810	1540	1860	3810	2370	1720	1180	1500	946
18	1020	1140	1930	1520	1880	1880	3740	2260	1430	865	1580	1090
19	1220	1520	1830	900	1860	1870	3560	2010	1540	779	879	1320
20	1080	1900	1850	1100	1840	1910	3710	2170	1100	830	728	1580
21	820	1920	1910	1340	1870	1980	3370	2370	879	974	802	1640
22	1030	1910	1900	1620	1880	1990	3220	2310	1140	1580	813	1740
23	1240	1880	1940	1850	1870	1990	2890	2390	1540	883	1040	1830
24	990	1940	2010	1680	1900	2100	2440	2900	1650	1040	1100	1220
25	805	1980	2700	1520	1950	2230	2390	2440	1080	1740	1300	1010
26	1210	1980	3970	1520	1940	1910	2080	2400	862	1210	1090	1430
27	1210	1980	3740	1440	1940	2020	2150	2390	1160	1060	1090	1770
28	818	1990	3160	1610	1900	2220	1890	2490	1750	1070	949	1410
29	1070	1960	2640	956	---	2890	2000	2630	1460	883	1070	1080
30	909	1960	3000	1410	---	3120	2120	2400	1140	848	848	1090
31	839	---	2820	1850	---	2810	---	2390	---	1700	816	---
TOTAL	31473	51040	81810	54276	48900	62120	91500	88320	50071	36905	37189	34680
MEAN	1015	1701	2639	1751	1746	2004	3050	2849	1669	1190	1200	1156
MAX	1300	1990	4190	2490	1990	3120	4320	4230	2380	1880	1800	1830
MIN	782	1140	1830	900	1200	1280	1890	2010	862	779	696	764
CFSM	.63	1.06	1.65	1.09	1.09	1.25	1.91	1.78	1.04	.74	.75	.72
IN.	.73	1.19	1.90	1.26	1.14	1.44	2.13	2.05	1.16	.86	.86	.81

CAL YR 1982 TOTAL 682055 MEAN 1869 MAX 7440 MIN 600 CFSM 1.17 IN 15.86
WTR YR 1983 TOTAL 668284 MEAN 1831 MAX 4320 MIN 696 CFSM 1.14 IN 15.54

04108600 RABBIT RIVER NEAR HOPKINS, MI

LOCATION.--Lat 42°38'32", long 85°43'19", in SE1/4 sec.16, T.3 N., R.12 W., Allegan County, Hydrologic Unit 04050003, on left bank at downstream side of bridge on 18th Street, 2.5 mi northeast of Hopkins.

DRAINAGE AREA.--71.4 mi^2.

PERIOD OF RECORD.--October 1965 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 700 ft from topographic map (nearest 10 ft).

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--18 years, 57.0 ft^3/s, 10.84 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,180 ft^3/s June 26, 1978, gage height, 9.56 ft; minimum not determined; minimum daily, 9.2 ft^3/s Aug. 27, 28, 1970, Sept. 18, 1971; minimum gage height, 1.89 ft Aug. 28, 1977.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 300 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Dec. 3	2200	322	7.38	Apr. 14	1600	412	7.51
Dec. 25	1700	598	8.17	May 2	0900	*624	*8.21

Minimum discharge, 17 ft^3/s Oct. 4, 5, 6, 7; minimum gage height, 2.03 ft Aug. 21.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	18	22	37	90	40	53	106	125	62	50	35	22
2	18	45	38	83	50	53	141	489	57	44	30	20
3	18	41	232	71	100	52	207	390	56	39	28	22
4	18	32	280	65	60	52	152	256	77	36	29	20
5	17	27	234	60	50	52	107	161	69	33	28	19
6	17	26	248	56	47	52	91	123	60	30	27	30
7	18	26	182	54	44	84	88	109	56	29	26	31
8	19	25	107	52	42	101	83	118	51	28	25	26
9	19	24	77	52	40	93	90	106	47	27	23	24
10	20	33	61	60	39	76	168	89	45	27	23	23
11	20	35	52	70	39	67	177	79	43	27	29	24
12	19	59	41	66	40	59	116	72	41	26	35	24
13	19	54	41	54	42	55	126	68	39	25	28	23
14	19	41	36	50	44	53	364	65	37	24	26	22
15	19	33	37	48	48	49	339	64	37	23	24	20
16	19	29	40	47	60	47	214	60	36	23	23	23
17	19	26	38	48	94	45	140	57	33	23	23	25
18	18	25	37	52	78	47	118	55	31	24	24	26
19	18	24	38	48	79	148	99	71	30	24	23	29
20	20	43	40	42	95	116	89	108	30	23	22	36
21	25	53	37	40	90	81	80	84	29	23	20	63
22	23	40	35	40	89	79	72	85	28	31	26	58
23	22	42	51	40	105	78	68	118	27	32	24	57
24	21	47	83	40	87	75	64	89	27	28	22	48
25	20	37	418	40	68	68	61	73	27	27	21	39
26	20	31	432	39	59	66	59	67	26	25	21	35
27	19	29	287	37	56	106	56	61	30	24	21	32
28	19	29	208	34	53	270	58	56	128	24	22	30
29	19	49	164	35	---	254	72	60	80	31	21	28
30	19	45	122	40	---	165	100	69	56	35	21	27
31	18	---	102	48	---	127	---	66	---	40	25	---
TOTAL	597	1072	3835	1601	1738	2723	3705	3493	1395	905	775	906
MEAN	19.3	35.7	124	51.6	62.1	87.8	124	113	46.5	29.2	25.0	30.2
MAX	25	59	432	90	105	270	364	489	128	50	35	63
MIN	17	22	35	34	39	45	56	55	26	23	20	19
CFSM	.27	.50	1.74	.72	.87	1.23	1.74	1.58	.65	.41	.35	.42
IN.	.31	.56	2.00	.83	.91	1.42	1.93	1.82	.73	.47	.40	.47

CAL YR 1982 TOTAL 20017 MEAN 54.8 MAX 432 MIN 15 CFSM .77 IN 10.43
WTR YR 1983 TOTAL 22745 MEAN 62.3 MAX 489 MIN 17 CFSM .87 IN 11.85

04108690 KALAMAZOO RIVER AT SAUGATUCK, MI
(National stream-quality accounting network station)

LOCATION.--Lat 42°38'50", long 86°11'53", in NE1/4 sec.16, T.3 N., R.16 W., Allegan County, Hydrologic Unit 04050003, at bridge on Old US-31 between Saugatuck and Douglas, 7.9 mi downstream from Rabbit River, 17.6 mi downstream from gaging station near Fennville (04108500), and 2.9 mi upstream from mouth.

DRAINAGE AREA.--2,020 mi^2, approximately.

PERIOD OF RECORD.--Water years 1974 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: February 1974 to September 1981.
WATER TEMPERATURES: May 1975 to September 1981.

INSTRUMENTATION.--Water-quality monitor November 1975 to September 1981.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum recorded (water years 1974-75, 1979-81), 747 micromhos Apr. 30, 1980; minimum recorded (water years 1974-75, 1978-79, 1981), 172 micromhos Sept. 18, 1978.
WATER TEMPERATURES: Maximum recorded (water years 1975, 1977-81), 31.5°C July 20, 1977; minimum, 0.0°C on many days during winter periods.

WATER QUALITY DATA, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DATE	TIME	STREAM-FLOW, INSTANTANEOUS (CFS)	SPECIFIC CONDUCTANCE (UMHOS)	PH (STANDARD UNITS)	TEMPERATURE (DEG C)	TURBIDITY (NTU)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)	COLIFORM, FECAL, 0.7 UM-MF (COLS./100 ML)	STREPTOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)
NOV 02...	1030	1840	623	7.8	11.5	16	9.0	85	K160	1240
MAR 08...	1100	2220	520	8.0	11.0	15	9.0	83	K150	K80
APR 21...	1200	3870	459	8.3	8.5	6.0	12.8	110	K73	K73
SEP 14...	1130	1180	550	8.2	19.5	7.1	8.1	89	250	3000

DATE	HARDNESS (MG/L AS CACO3)	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	PERCENT SODIUM	SODIUM ADSORPTION RATIO	POTASSIUM, DISSOLVED (MG/L AS K)	ALKALINITY LAB (MG/L AS CACO3)	CARBON DIOXIDE DISSOLVED (MG/L AS CO2)
NOV 02...	257	68	21	22	16	.6	1.9	216	6.6
MAR 08...	236	63	19	16	13	.5	2.0	197	3.8
APR 21...	220	60	17	13	11	.4	2.1	174	1.7
SEP 14...	246	62	22	25	18	.7	2.1	200	2.4

DATE	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, DISSOLVED (MG/L AS F)	SILICA, DISSOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	SOLIDS, DISSOLVED (TONS PER AC-FT)	SOLIDS, DISSOLVED (TONS PER DAY)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N)
NOV 02...	52	36	.3	7.7	345	339	.47	1710	1.0
MAR 08...	45	28	.2	6.1	320	299	.44	1920	1.2
APR 21...	41	20	.2	3.9	309	262	.42	3230	.89
SEP 14...	47	39	.2	2.5	353	320	.48	1120	.53

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04108690 KALAMAZOO RIVER AT SAUGATUCK, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DATE	NITROGEN, AMMONIA DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS, DISSOLVED (MG/L AS P)	PHOSPHORUS, ORTHO, DISSOLVED (MG/L AS P)	PHOSPHATE, ORTHO, DISSOLVED (MG/L AS PO4)	SEDIMENT, SUSPENDED (MG/L)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
NOV									
02...	.110	1.10	.100	.060	.040	.12	19	94	100
MAR									
08...	.180	1.00	.100	.030	.020	.06	17	102	100
APR									
21...	.020	.80	.060	.020	.020	.06	10	104	100
SEP									
14...	.080	1.00	.120	.050	.050	.15	20	64	100

DATE	TIME	ALUMINUM, DISSOLVED (UG/L AS AL)	ARSENIC DISSOLVED (UG/L AS AS)	BARIUM, DISSOLVED (UG/L AS BA)	BERYLLIUM, DISSOLVED (UG/L AS BE)	CADMIUM DISSOLVED (UG/L AS CD)	CHROMIUM, DISSOLVED (UG/L AS CR)	COBALT, DISSOLVED (UG/L AS CO)	COPPER, DISSOLVED (UG/L AS CU)	IRON, DISSOLVED (UG/L AS FE)	LEAD, DISSOLVED (UG/L AS PB)
NOV											
02...	1030	10	2	70	<1	<1	<1	<3	3	71	2
MAR											
08...	1100	<10	1	67	<1	<1	<1	<3	1	77	2
APR											
21...	1200	10	1	87	<1	<1	<1	<3	9	85	4
SEP											
14...	1130	10	2	80	<1	<1	<1	<3	2	12	2

DATE	LITHIUM DISSOLVED (UG/L AS LI)	MANGANESE, DISSOLVED (UG/L AS MN)	MERCURY DISSOLVED (UG/L AS HG)	MOLYBDENUM, DISSOLVED (UG/L AS MO)	NICKEL, DISSOLVED (UG/L AS NI)	SELENIUM, DISSOLVED (UG/L AS SE)	SILVER, DISSOLVED (UG/L AS AG)	STRONTIUM, DISSOLVED (UG/L AS SR)	VANADIUM, DISSOLVED (UG/L AS V)	ZINC, DISSOLVED (UG/L AS ZN)
NOV										
02...	11	26	<.1	<10	2	<1	<1	150	<6.0	<4
MAR										
08...	<4	59	<.1	<10	2	<1	<1	140	<6.0	<3
APR										
21...	<4	15	<.1	<10	3	<1	<1	120	<6.0	7
SEP										
14...	<4	12	.1	<10	2	<1	<1	140	<6.0	7

04108800 MACATAWA RIVER NEAR ZEELAND, MI

LOCATION.--Lat 42°46'40", long 86°01'06", in NW1/4 sec.31, T.5 N., R.14 W., Ottawa County, Hydrologic Unit 04050002, on left bank 20 ft upstream from bridge on State Road, 0.2 mi downstream from South Branch, and 2.5 mi south of Zeeland.

DRAINAGE AREA.--65.8 mi^2.

PERIOD OF RECORD.--October 1960 to current year. Prior to October 1978, published as Black River near Zeeland.

GAGE.--Water-stage recorder. Datum of gage is 585.7 ft National Geodetic Vertical Datum of 1929 (levels by Gove Associates, Inc.).

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--23 years, 65.5 ft^3/s, 13.52 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 7,220 ft^3/s May 11, 1981, gage height, 15.81 ft; minimum, 0.9 ft^3/s Aug. 24, 1962; minimum gage height, 1.61 ft Sept. 3, 1983.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 900 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Dec. 3	1200	*3,200	*13.21	Dec. 25	1700	1,340	10.97
Dec. 6	0400	1,000	10.21	Apr. 14	1700	1,430	11.17

Minimum discharge, 2.1 ft^3/s Sept. 3, gage height, 1.61 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	5.7	9.3	92	44	26	27	67	53	30	12	23	3.3
2	5.5	58	618	41	87	25	307	634	20	9.1	10	3.1
3	5.3	31	2370	35	243	22	429	237	22	7.7	7.6	3.0
4	5.2	17	1340	30	59	21	124	85	48	6.4	8.0	3.0
5	5.2	15	771	29	40	20	68	53	30	5.6	6.5	2.9
6	5.2	16	900	28	32	18	55	43	21	5.2	5.7	5.3
7	5.4	15	500	27	27	168	52	56	18	4.8	5.2	4.3
8	5.3	14	250	27	25	357	44	196	15	4.7	4.6	3.4
9	5.6	16	120	28	24	100	64	67	13	4.5	4.1	3.5
10	6.9	73	60	38	23	58	196	41	12	4.4	4.1	3.7
11	6.9	100	40	173	23	46	88	32	11	4.1	37	7.2
12	6.5	355	35	103	23	31	51	28	10	3.6	13	4.1
13	5.8	140	32	49	23	26	144	25	9.5	3.7	7.0	3.6
14	6.0	63	30	35	26	24	1070	24	8.6	3.6	5.5	3.6
15	5.9	40	33	30	50	20	697	23	8.3	3.6	4.9	3.2
16	5.9	31	41	27	100	19	167	20	8.1	3.7	4.4	4.3
17	5.5	25	38	25	200	18	76	19	7.3	3.6	5.3	4.2
18	5.3	23	35	23	175	21	56	18	6.8	4.0	5.4	4.5
19	5.2	21	62	22	222	339	46	35	6.6	3.9	4.5	4.9
20	10	244	70	19	308	119	39	49	6.3	3.6	4.0	4.3
21	9.5	274	45	20	201	48	34	30	6.1	4.0	3.7	8.3
22	7.4	105	36	20	155	53	31	36	5.7	7.8	6.2	7.0
23	6.2	110	94	21	171	67	28	60	5.4	5.5	4.5	12
24	5.9	113	203	23	85	71	25	33	5.5	4.2	4.0	16
25	5.6	65	936	26	48	58	23	28	5.1	3.6	4.0	7.7
26	5.6	55	695	22	31	53	22	25	4.8	3.3	4.5	6.4
27	5.3	55	176	18	28	183	20	20	6.7	3.3	4.2	5.6
28	5.5	71	295	16	26	659	28	18	14	45	3.9	4.8
29	5.5	265	142	17	---	530	31	48	8.9	65	3.5	4.2
30	5.6	160	64	104	---	175	59	33	18	14	3.9	3.7
31	5.7	---	48	54	---	104	---	36	---	90	4.2	---
TOTAL	186.1	2579.3	10171	1174	2483	3480	4141	2105	391.7	347.5	216.4	155.1
MEAN	6.00	86.0	328	37.9	88.7	112	138	67.9	13.1	11.2	6.98	5.17
MAX	10	355	2370	173	308	659	1070	634	48	90	37	16
MIN	5.2	9.3	30	16	23	18	20	18	4.8	3.3	3.5	2.9
CFSM	.09	1.31	4.99	.58	1.35	1.70	2.10	1.03	.20	.17	.11	.08
IN.	.11	1.46	5.75	.66	1.40	1.97	2.34	1.19	.22	.20	.12	.09

CAL YR 1982 TOTAL 37720.9 MEAN 103 MAX 2500 MIN 4.8 CFSM 1.57 IN 21.33
WTR YR 1983 TOTAL 27430.1 MEAN 75.2 MAX 2370 MIN 2.9 CFSM 1.14 IN 15.51

04109000 GRAND RIVER AT JACKSON, MI

LOCATION.--Lat 42°17'05", long 84°24'30", in sec.22, T.2 S., R.1 W., Jackson County, Hydrologic Unit 04050004, on left bank of sewage-treatment plant, 1 mi north of Jackson, 2.2 mi upstream from Portage River, and at mile 216.

DRAINAGE AREA.--174 mi^2.

PERIOD OF RECORD.--April 1935 to current year.

REVISED RECORDS.--WSP 974: 1937(M). WSP 1387: 1936. WSP 1727: 1950(M).

GAGE.--Water-stage recorder. Datum of gage is 900.00 ft Fargo Engineering Co. datum. Prior to Sept. 24,1935, nonrecording gage at same site and datum.

REMARKS.--Records good. Slight regulation by mills above station. Flow includes about 17 ft^3/s as sewage effluent, which originates from ground-water sources, from the city of Jackson. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--48 years, 122 ft^3/s, 9.52 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,070 ft^3/s June 25, 1937, gage height, 13.50 ft; maximum gage height, 15.44 ft June 25, 1968; minimum discharge, 9.2 ft^3/s Aug. 22, 1936.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 588 ft^3/s May 7, gage height, 12.55 ft; minimum, 35 ft^3/s Sept. 5, gage height, 8.43 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	136	118	201	192	85	122	243	313	218	199	215	56
2	76	213	200	188	117	107	250	422	212	183	195	54
3	59	223	213	187	167	103	246	439	237	130	174	46
4	64	231	213	179	167	104	243	450	225	123	173	41
5	64	228	216	131	156	152	245	455	216	126	164	39
6	62	194	212	109	156	162	283	458	249	130	112	68
7	62	175	206	106	160	178	309	478	264	169	96	62
8	58	178	206	98	143	218	296	488	217	159	90	55
9	50	186	204	93	95	214	310	459	193	96	82	52
10	59	183	199	107	88	239	310	415	188	81	76	49
11	59	191	189	165	81	220	308	386	175	82	176	44
12	58	201	180	166	78	209	301	362	159	80	172	49
13	58	181	177	167	75	206	314	342	155	75	158	48
14	59	176	161	163	84	205	344	320	170	72	145	44
15	55	174	125	157	86	198	332	293	169	70	101	44
16	48	130	142	129	88	192	325	279	108	65	83	63
17	45	120	176	102	107	185	350	246	101	97	79	47
18	53	162	176	81	157	187	339	225	92	95	81	43
19	109	167	179	82	162	187	331	238	81	93	83	68
20	122	220	182	78	162	172	329	216	91	81	111	71
21	61	189	181	76	168	179	321	203	135	90	58	84
22	50	193	202	75	177	183	286	245	78	120	71	120
23	48	242	130	100	183	182	268	242	71	145	65	105
24	43	243	138	145	185	181	256	231	69	138	61	52
25	49	152	199	142	184	178	248	244	65	135	59	47
26	52	149	197	138	177	174	237	236	60	133	59	52
27	53	192	207	126	170	200	267	231	105	118	55	55
28	54	208	254	78	169	222	276	228	148	99	48	54
29	61	210	254	75	---	224	242	242	173	83	51	52
30	57	204	221	94	---	259	290	226	180	145	60	53
31	60	---	199	85	---	268	---	224	---	245	57	---
TOTAL	1944	5633	5939	3814	3827	5810	8699	9836	4604	3657	3210	1717
MEAN	62.7	188	192	123	137	187	290	317	153	118	104	57.2
MAX	136	243	254	192	185	268	350	488	264	245	215	120
MIN	43	118	125	75	75	103	237	203	60	65	48	39
CFSM	.36	1.08	1.10	.71	.79	1.08	1.67	1.82	.88	.68	.60	.33
IN.	.42	1.20	1.27	.82	.82	1.24	1.86	2.10	.98	.78	.69	.37

CAL YR 1982 TOTAL 58907 MEAN 161 MAX 580 MIN 34 CFSM .93 IN 12.59
WTR YR 1983 TOTAL 58690 MEAN 161 MAX 488 MIN 39 CFSM .93 IN 12.55

04111379 RED CEDAR RIVER NEAR WILLIAMSTON, MI

LOCATION.--Lat 42°40'59", long 84°13'09", in NE1/4 sec.4, T.3 N., R.2 E., Ingham County, Hydrologic Unit 04050004, on right bank 20 ft upstream from bridge on State Highway 52, 1.5 mi upstream from Squaw Creek, and 3.5 mi east of Williamston.

DRAINAGE AREA.--163 mi^2.

PERIOD OF RECORD.--July 1975 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 870 ft from topographic map (nearest 10 ft).

REMARKS.--Records good. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--8 years, 102 ft^3/s, 8.50 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,390 ft^3/s Mar. 15, 1982, gage height, 8.42 ft; minimum, 5.1 ft^3/s Sept. 12, 1978, gage height, 2.03 ft.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of April 1975, reached a gage height of 10.41 ft Apr. 19, and a discharge of 2,640 ft^3/s Apr. 20.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 501 ft^3/s May 3, 4, gage height, 6.12 ft; minimum, 6.6 ft^3/s Sept. 15, gage height, 2.13 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	29	25	101	116	77	92	350	252	139	221	34	16
2	26	42	93	103	93	90	326	409	127	182	33	15
3	24	69	97	91	186	89	353	495	120	116	29	13
4	23	64	126	84	164	90	362	498	165	83	27	12
5	22	52	151	80	126	93	333	481	199	71	26	11
6	22	44	188	74	103	101	311	432	211	60	25	15
7	21	39	172	74	80	123	301	381	218	53	23	16
8	22	35	141	71	69	180	299	396	212	49	21	15
9	22	34	118	69	66	250	285	391	196	45	20	13
10	22	41	99	73	55	255	320	348	172	42	19	11
11	22	48	84	84	44	237	328	311	142	39	31	11
12	22	69	74	86	47	209	316	273	112	37	31	11
13	21	78	60	78	50	167	301	236	90	34	26	10
14	21	71	63	76	50	135	367	196	79	33	23	10
15	20	62	64	71	56	120	451	156	71	32	22	9.1
16	19	54	85	42	61	108	430	130	66	32	21	13
17	19	48	93	57	84	100	422	115	60	31	20	16
18	19	45	93	47	93	101	406	104	56	29	20	16
19	20	42	90	45	93	121	379	103	52	31	19	38
20	20	70	98	40	112	143	364	159	48	34	17	27
21	21	103	103	38	124	136	353	197	47	31	14	31
22	22	104	97	38	129	116	337	215	45	29	16	29
23	22	97	97	43	154	126	322	258	41	28	17	25
24	20	105	137	47	170	133	299	275	40	27	16	22
25	20	101	205	49	156	125	270	278	39	25	15	19
26	20	90	255	45	118	118	237	268	35	24	13	18
27	21	79	234	43	106	131	201	242	43	22	15	18
28	21	73	224	41	97	278	174	212	139	22	14	17
29	19	88	227	45	---	379	205	182	237	25	12	17
30	20	103	190	73	---	379	222	159	234	28	15	16
31	20	---	143	89	---	372	---	147	---	30	17	---
TOTAL	662	1975	4002	2012	2763	5097	9624	8299	3435	1545	651	510.1
MEAN	21.4	65.8	129	64.9	98.7	164	321	268	115	49.8	21.0	17.0
MAX	29	105	255	116	186	379	451	498	237	221	34	38
MIN	19	25	60	38	44	89	174	103	35	22	12	9.1
CFSM	.13	.40	.79	.40	.61	1.01	1.97	1.64	.71	.31	.13	.10
IN.	.15	.45	.91	.46	.63	1.16	2.20	1.89	.78	.35	.15	.12

CAL YR 1982 TOTAL 41424.0 MEAN 113 MAX 1360 MIN 16 CFSM .69 IN 9.45
WTR YR 1983 TOTAL 40575.1 MEAN 111 MAX 498 MIN 9.1 CFSM .68 IN 9.26

04111500 DEER CREEK NEAR DANSVILLE, MI

LOCATION.--Lat 42°36'30", long 84°19'15", in E1/2 sec.33, T.3 N., R.1 E., Ingham County, Hydrologic Unit 04050004, on right bank 15 ft upstream from bridge on Clark Road, 3.5 mi north of Dansville, and 7.2 mi upstream from mouth.

DRAINAGE AREA.--16.3 mi^2.

PERIOD OF RECORD.--May 1954 to current year.

REVISED RECORDS.--WSP 1727: 1954(M).

GAGE.--Water-stage recorder and concrete control. Datum of gage is 889.08 ft National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources).

REMARKS.--Records good. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--29 years, 10.6 ft^3/s, 8.83 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 962 ft^3/s Apr. 19, 1975, gage height, 12.18 ft, from flood mark, rating curve extended above 610 ft^3/s; minimum, 0.04 ft^3/s Sept. 8, 9, 12, 1978, gage height, 2.58 ft.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 100 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Mar. 28	0800	130	4.81	Apr. 14	1500	154	5.15
Apr. 10	0100	120	4.67	May 2	1000	*172	*5.41

Minimum discharge, 0.14 ft^3/s Sept. 5, 6; minimum gage height, 2.64 ft Sept. 5, 6, 13, 14, 15.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.6	1.5	12	13	8.3	12	37	35	12	50	1.5	.39
2	1.3	3.8	11	12	24	12	42	142	11	24	1.3	.34
3	1.2	6.3	13	10	40	12	66	71	13	14	1.0	.25
4	1.1	4.2	21	9.0	18	12	47	43	37	9.8	.95	.21
5	1.1	3.1	25	7.8	13	12	33	31	24	8.4	.90	.17
6	1.0	2.6	26	7.7	8.4	14	31	24	21	6.1	.92	.50
7	1.0	2.4	19	8.0	7.4	17	39	22	21	4.9	.81	.50
8	1.0	2.2	15	7.3	7.0	54	35	67	15	4.1	.65	.39
9	.85	2.2	12	7.2	6.2	53	48	43	12	3.6	.58	.35
10	.90	3.4	11	8.6	5.8	33	100	28	9.4	3.3	.65	.31
11	1.0	4.3	9.3	11	5.2	24	65	23	8.0	2.9	1.2	.26
12	1.0	10	8.1	11	4.5	19	42	19	6.8	2.5	1.2	.23
13	.91	11	6.3	8.6	4.2	16	38	15	5.9	2.1	.90	.23
14	.90	7.2	5.8	8.0	5.5	16	122	13	5.2	1.9	.73	.19
15	.90	5.5	6.4	7.2	8.7	14	81	12	4.7	1.8	.65	.21
16	.89	4.7	12	6.4	12	12	45	11	4.4	1.5	.65	.38
17	.83	4.2	12	5.5	20	11	39	10	3.9	1.5	.67	.67
18	.85	3.9	11	5.7	15	12	38	8.9	3.5	1.8	.84	.57
19	.89	3.7	11	5.2	16	22	32	12	3.3	2.3	.50	1.0
20	.91	12	14	4.5	21	21	35	28	3.1	2.1	.42	.65
21	1.0	16	13	4.2	21	17	30	18	2.9	1.9	.35	1.1
22	.99	13	11	4.0	22	17	24	33	2.6	2.0	.42	.95
23	.97	12	13	4.5	34	20	21	46	2.5	1.7	.40	.80
24	1.0	16	28	5.1	25	18	18	26	2.1	1.5	.36	.70
25	.99	12	50	5.0	18	16	16	21	2.0	1.3	.34	.65
26	1.0	10	43	4.7	16	15	14	18	1.8	1.2	.33	.65
27	1.0	8.3	27	4.3	12	32	13	15	4.3	1.1	.34	.62
28	1.0	8.2	38	4.1	12	120	17	13	39	1.2	.29	.57
29	.95	14	32	4.0	---	80	24	13	28	1.5	.25	.46
30	.93	14	20	18	---	52	27	14	23	1.3	.29	.45
31	.98	---	16	12	---	42	---	13	---	1.2	.45	---
TOTAL	30.94	221.7	551.9	233.6	410.2	827	1219	887.9	332.4	164.5	20.84	14.75
MEAN	1.00	7.39	17.8	7.54	14.7	26.7	40.6	28.6	11.1	5.31	.67	.49
MAX	1.6	16	50	18	40	120	122	142	39	50	1.5	1.1
MIN	.83	1.5	5.8	4.0	4.2	11	13	8.9	1.8	1.1	.25	.17
CFSM	.06	.45	1.09	.46	.90	1.64	2.49	1.76	.68	.33	.04	.03
IN.	.07	.51	1.26	.53	.94	1.89	2.78	2.03	.76	.38	.05	.03

CAL YR 1982 TOTAL 4672.00 MEAN 12.8 MAX 340 MIN .22 CFSM .79 IN 10.66
WTR YR 1983 TOTAL 4914.73 MEAN 13.5 MAX 142 MIN .17 CFSM .83 IN 11.22

04112000 SLOAN CREEK NEAR WILLIAMSTON, MI

LOCATION.--Lat 42°40'33", long 84°21'50", in SE1/4 NE1/4 sec.1, T.3 N., R.1 W., Ingham County, Hydrologic Unit 04050004, on left bank 30 ft downstream from culvert on Meridian Road, 2.1 mi upstream from mouth, and 4.2 mi west of Williamston.

DRAINAGE AREA.--9.34 mi^2.

PERIOD OF RECORD.--June 1954 to current year.

GAGE.--Water-stage recorder and concrete control with V-notch sharp-crested weir. Datum of gage is 862.12 ft National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources).

REMARKS.--Records good except those for periods of no gage-height record, Nov. 20 to Dec. 30, Jan. 15 to Feb. 10, and those for the months of August and September, which are poor. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--29 years, 5.70 ft^3/s, 8.29 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,290 ft^3/s Apr. 18, 1975, gage height, 9.99 ft, from rating curve extended above 660 ft^3/s on basis of computation of peak flow through culvert and over road embankment; minimum, 0.01 ft^3/s Sept. 11, 1954, Jan. 18, 1957, gage height, 1.10 ft.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 173 ft^3/s May 2, gage height, 4.36 ft, only peak above base of 120 ft^3/s; minimum, 0.11 ft^3/s Aug. 17; minimum gage height, 1.39 ft Aug. 8, 9, 16, 17.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.68	.48	6.0	6.6	4.5	5.1	23	19	4.2	14	.36	.36
2	.57	3.9	6.0	5.8	13	5.0	28	90	3.8	7.5	.33	.30
3	.53	11	8.0	5.0	20	4.7	43	37	5.4	5.1	.28	.27
4	.46	4.3	12	4.3	9.0	4.8	30	26	17	3.8	.30	.21
5	.42	2.8	13	4.1	6.5	4.7	20	18	10	3.1	.26	.18
6	.40	2.1	13	3.9	4.5	5.1	18	12	8.3	2.6	.25	.32
7	.36	1.7	10	3.8	3.8	9.9	26	14	7.8	2.2	.20	.32
8	.36	1.5	8.0	3.4	3.4	58	20	39	5.6	1.9	.18	.32
9	.35	1.3	6.0	3.3	3.0	38	33	22	4.5	1.7	.23	.32
10	.35	2.1	5.5	3.8	2.7	25	49	14	3.9	1.4	.25	.28
11	.35	2.9	5.0	4.8	2.4	17	33	10	3.4	1.2	.55	.31
12	.35	12	4.3	4.5	2.1	12	23	7.6	3.0	1.1	.35	.30
13	.35	8.7	3.5	4.0	2.0	8.6	21	6.2	2.7	.90	.22	.28
14	.35	4.9	3.0	3.7	3.4	8.0	63	5.5	2.4	.80	.19	.29
15	.36	3.7	3.5	3.5	5.3	6.8	36	4.8	2.3	.75	.17	.29
16	.36	3.1	6.5	3.3	7.9	5.9	25	4.2	2.1	.67	.15	.72
17	.32	2.7	6.0	3.0	13	5.3	21	3.8	1.8	.61	.14	.81
18	.31	2.4	6.0	2.7	8.8	6.0	20	3.5	1.6	.75	.15	.78
19	.31	2.2	6.0	2.4	9.0	20	17	4.4	1.4	.60	.19	2.1
20	.33	10	7.0	2.3	11	15	17	7.2	1.3	.56	.20	.93
21	.33	13	6.5	2.1	10	9.9	13	5.8	1.2	.54	.24	1.1
22	.33	8.0	6.0	2.1	11	9.3	9.7	21	1.1	.60	.28	1.0
23	.33	10	9.0	2.4	19	9.2	8.0	21	.97	.53	.28	.84
24	.32	13	15	2.7	13	9.0	6.9	12	.89	.46	.25	.70
25	.33	8.0	25	2.6	8.1	8.3	5.9	8.7	.84	.41	.25	.59
26	.33	5.5	22	2.4	5.8	8.2	5.1	7.4	.78	.38	.26	.54
27	.33	4.5	15	2.2	5.2	24	4.6	5.8	2.5	.35	.23	.50
28	.32	5.0	19	2.1	5.1	70	10	4.9	41	.39	.21	.45
29	.31	7.5	16	2.1	---	43	14	5.0	28	.42	.19	.34
30	.31	7.0	10	9.0	---	33	13	4.9	15	.41	.27	.23
31	.33	---	8.1	6.0	---	28	---	4.5	---	.39	.39	---
TOTAL	11.44	165.28	289.9	113.9	212.5	516.8	656.2	449.2	184.78	56.12	7.80	15.98
MEAN	.37	5.51	9.35	3.67	7.59	16.7	21.9	14.5	6.16	1.81	.25	.53
MAX	.68	13	25	9.0	20	70	63	90	41	14	.55	2.1
MIN	.31	.48	3.0	2.1	2.0	4.7	4.6	3.5	.78	.35	.14	.18
CFSM	.04	.59	1.00	.39	.81	1.79	2.35	1.55	.66	.19	.03	.06
IN.	.05	.66	1.15	.45	.85	2.06	2.61	1.79	.74	.22	.03	.06

CAL YR 1982 TOTAL 2465.97 MEAN 6.76 MAX 300 MIN .09 CFSM .72 IN 9.82
WTR YR 1983 TOTAL 2679.90 MEAN 7.34 MAX 90 MIN .14 CFSM .79 IN 10.67

04112500 RED CEDAR RIVER AT EAST LANSING, MI

LOCATION.--Lat 42°43'40", long 84°28'40", in SW1/4 sec.18, T.4 N., R.1 W., Ingham County, Hydrologic Unit 04050004, in left downstream bridge abutment of Farm Lane Bridge on Michigan State University Campus in East Lansing, 4.0 mi upstream from Sycamore Creek, and 5.6 mi upstream from mouth.

DRAINAGE AREA.--355 mi^2.

PERIOD OF RECORD.--August 1902 to December 1903, March 1931 to current year. Monthly discharge only for some periods, published in WSP 1307. Published as Red Cedar River at Agricultural College, August 1902 to December 1903 and as Cedar River at East Lansing, March 1931 to September 1965. Gage-height records collected in this vicinity 1911-19, and for flood seasons only 1920-28, are contained in reports of U.S. Weather Bureau.

REVISED RECORDS.--WSP 1307: 1936(M).

GAGE.--Water-stage recorder and concrete control. Datum of gage is 824.39 ft National Geodetic Vertical Datum of 1929. August 1902 to December 1903 nonrecording gage at site 0.8 mi downstream at different datum. March 1931 to November 1940 water-stage recorder at site 250 ft upstream at present datum.

REMARKS.--Records good. Prior to April 1975, occasional regulation at low flow by mill at Williamston, 16 mi above station. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--53 years, 206 ft^3/s, 7.88 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 5,940 ft^3/s Apr. 20, 1975, gage height, 11.95 ft; minimum, 3 ft^3/s July 31, 1931.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of Mar. 24, 1904, reached a stage of 13.4 ft, discharge, 8,000 ft^3/s.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,280 ft^3/s May 3, gage height, 6.01 ft; minimum, 26 ft^3/s Sept. 12-15, gage height, 3.15 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	62	57	236	279	205	208	760	540	339	462	55	38
2	55	92	219	247	198	202	705	980	311	411	57	36
3	51	170	264	222	403	194	820	1260	295	311	53	34
4	49	177	363	170	431	194	880	1190	387	219	49	31
5	42	135	399	180	283	198	790	1010	453	177	47	29
6	42	114	435	170	226	208	665	850	431	146	47	51
7	40	97	387	166	202	244	640	740	427	120	44	36
8	38	84	319	163	163	560	660	890	403	105	42	36
9	38	79	264	152	146	725	650	925	359	97	38	32
10	40	84	226	156	120	655	860	810	315	89	44	31
11	40	97	198	177	95	530	895	650	279	84	72	28
12	40	138	160	194	102	435	795	540	240	77	62	26
13	40	194	132	177	108	375	690	458	198	72	55	26
14	40	188	146	163	108	323	850	407	170	65	49	26
15	40	160	138	156	126	283	1080	367	160	65	42	26
16	40	138	174	89	146	250	1050	323	146	62	42	38
17	40	123	205	126	205	230	905	291	126	72	44	34
18	40	111	198	102	240	230	805	268	114	65	40	42
19	38	100	194	100	233	283	745	272	105	60	40	120
20	42	132	205	89	250	347	695	335	97	60	36	89
21	40	233	219	84	279	331	665	415	89	69	44	79
22	40	258	212	84	291	303	630	458	87	65	47	72
23	40	247	205	89	339	287	565	620	84	57	36	65
24	40	261	315	100	387	291	510	625	74	55	34	55
25	41	244	510	105	351	287	458	560	69	53	34	49
26	38	212	610	100	287	272	415	525	67	49	32	44
27	38	184	545	92	240	319	375	471	123	44	29	42
28	38	170	490	89	219	715	387	427	605	44	28	40
29	38	202	520	92	---	940	458	403	740	51	29	38
30	38	244	431	126	---	960	476	383	550	55	42	36
31	38	---	343	230	---	855	---	355	---	53	42	---
TOTAL	1286	4725	9262	4469	6383	12234	20879	18348	7843	3414	1355	1329
MEAN	41.5	158	299	144	228	395	696	592	261	110	43.7	44.3
MAX	62	261	610	279	431	960	1080	1260	740	462	72	120
MIN	38	57	132	84	95	194	375	268	67	44	28	26
CFSM	.12	.45	.84	.41	.64	1.11	1.96	1.67	.74	.31	.12	.13
IN.	.13	.50	.97	.47	.67	1.28	2.19	1.92	.82	.36	.14	.14

CAL YR 1982 TOTAL 86784 MEAN 238 MAX 3480 MIN 23 CFSM .67 IN 9.09
WTR YR 1983 TOTAL 91527 MEAN 251 MAX 1260 MIN 26 CFSM .71 IN 9.59

04113000 GRAND RIVER AT LANSING, MI

LOCATION.--Lat 42°45'02", long 84°33'19", in NW1/4 sec.9, T.4 N., R.2 W., Ingham County, Hydrologic Unit 04050004, on right bank 30 ft upstream from bridge on North Grand River Avenue in Lansing, 2.0 mi downstream from Red Cedar River, and at mile 152.

DRAINAGE AREA.--1,230 mi^2, approximately.

PERIOD OF RECORD.--March 1901 to September 1906, October 1934 to current year. Monthly discharge only for some periods, published in WSP 1307. Published as "at North Lansing" 1901-6. Gage-height records collected in this vicinity 1907-10 (flood seasons only), 1911-19, 1920-28 (flood seasons only), and since 1931 are contained in reports of U.S. Weather Bureau.

REVISED RECORDS.--WSP 1174: 1949. WSP 1387: 1901, 1903-4, 1935, 1937, 1942.

GAGE.--Water-stage recorder. Datum of gage is 805.53 ft National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Prior to August 1906, nonrecording gage at same site at different datum. November 1934 to June 1949 water-stage recorder at site 1.8 mi downstream at datum 2.42 ft lower.

REMARKS.--Records good. Large diurnal fluctuation at medium and low flows caused by powerplants above station. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--54 years, 834 ft^3/s, 9.21 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 24,500 ft^3/s Mar. 26, 1904, gage height, 18.60 ft, datum then in use, from rating curve extended above 15,000 ft^3/s; minimum, 2.8 ft^3/s Sept. 9, 1963, gage height, 0.85 ft; minimum daily, 20 ft^3/s Aug. 25, 1941.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum discharge since at least 1901, that of Mar. 26, 1904.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 3,920 ft^3/s May 4, gage height, 8.46 ft; minimum daily, 150 ft^3/s Sept. 13.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	403	518	1100	1150	834	1050	2500	1980	1330	1300	455	219
2	387	421	1100	1050	917	967	2450	3350	1210	1140	572	270
3	352	671	1310	1000	1390	966	2620	3810	1260	1010	659	205
4	344	865	1430	900	1310	964	2760	3770	1470	878	632	198
5	289	668	1550	940	1170	841	2510	3480	1590	698	657	261
6	302	639	1720	1000	919	1010	2310	3020	1710	525	571	350
7	282	689	1610	970	941	1120	2270	2620	1690	597	508	237
8	225	581	1430	898	795	1680	2300	2980	1590	451	441	220
9	298	654	1330	858	786	2070	2500	3160	1500	546	409	208
10	235	690	1210	752	708	1930	3000	2920	1350	506	374	219
11	297	681	1140	942	526	1860	3050	2640	1310	460	551	221
12	243	913	1050	845	609	1670	2860	2230	1180	436	491	256
13	304	885	913	839	580	1490	2660	2070	1040	301	560	150
14	297	927	884	837	605	1460	3190	1860	952	380	545	234
15	210	848	930	900	668	1260	3520	1700	957	312	524	190
16	304	838	1030	594	699	1210	3450	1510	882	362	465	255
17	233	709	1020	732	858	1150	3210	1470	763	444	411	248
18	252	721	1040	562	973	1130	2790	1370	737	393	386	173
19	209	616	972	623	967	1310	2570	1440	712	340	302	717
20	371	887	1030	565	1000	1310	2370	1440	513	395	307	335
21	190	1060	1050	572	1170	1420	2300	1620	510	539	347	388
22	311	1080	1050	598	1230	1270	2160	1780	503	504	495	337
23	301	1150	1070	628	1320	1250	2010	1900	489	509	247	341
24	260	1220	1580	542	1420	1240	1920	1910	467	434	315	280
25	297	1130	1830	641	1290	1210	1740	1830	433	454	193	341
26	276	1090	1770	578	1300	1190	1620	1710	395	389	299	259
27	249	1040	1700	650	1080	1340	1500	1610	670	400	246	291
28	218	1020	1600	597	1090	2200	1690	1480	1270	423	210	196
29	296	1070	1500	616	---	2820	1750	1460	1540	412	251	266
30	276	1120	1400	748	---	2830	1800	1360	1580	514	256	276
31	225	---	1300	876	---	2690	---	1340	---	415	233	---
TOTAL	8736	25401	39649	24003	27155	45908	73380	66820	31603	16467	12912	8141
MEAN	282	847	1279	774	970	1481	2446	2155	1053	531	417	271
MAX	403	1220	1830	1150	1420	2830	3520	3810	1710	1300	659	717
MIN	190	421	884	542	526	841	1500	1340	395	301	193	150
CFSM	.23	.69	1.04	.63	.79	1.20	1.99	1.75	.86	.43	.34	.22
IN.	.26	.77	1.20	.73	.82	1.39	2.22	2.02	.96	.50	.39	.25

CAL YR 1982 TOTAL 373914 MEAN 1024 MAX 8580 MIN 115 CFSM .83 IN 11.31
WTR YR 1983 TOTAL 380175 MEAN 1042 MAX 3810 MIN 150 CFSM .85 IN 11.50

04114500 LOOKING GLASS RIVER NEAR EAGLE, MI

LOCATION.--Lat 42°49'45", long 84°46'40", in sec.10, T.5 N., R.4 W., Clinton County, Hydrologic Unit 04050004, on right bank at upstream side of former bridge site, 1.5 mi northeast of Eagle,and 10 mi upstream from mouth.

DRAINAGE AREA.--281 mi^2.

PERIOD OF RECORD.--August 1944 to current year.

REVISED RECORDS.--WSP 1387: 1946-47.

GAGE.--Water-stage recorder. Datum of gage is 747.09 ft National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Prior to June 2, 1962, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Small intermittent diversion at times into Lake Geneva when discharge is above 50 ft^3/s. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--39 years, 173 ft^3/s, 8.36 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,860 ft^3/s Apr. 5, 1947, gage height, 7.70 ft, from graph based on gage readings, from rating curve extended above 1,900 ft^3/s; maximum gage height, 9.9 ft Mar. 7, 1956, from high-water mark, backwater from ice; minimum discharge, 10 ft^3/s July 28, 1965, gage height, 1.01 ft.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,380 ft^3/s May 2, gage height, 5.51 ft; minimum, 32 ft^3/s Sept.5, 6, gage height, 1.40 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	99	68	222	395	170	271	502	459	304	218	67	41
2	104	101	218	398	190	261	628	1080	283	207	56	40
3	101	90	327	380	250	250	765	753	276	196	52	37
4	90	88	355	360	300	238	701	624	293	193	51	36
5	78	101	404	340	280	227	636	574	276	187	49	34
6	68	99	431	319	240	227	617	577	261	172	47	49
7	61	109	355	296	210	247	647	610	250	150	45	48
8	55	117	336	266	186	291	647	689	243	127	42	50
9	51	123	336	243	160	336	729	685	238	106	39	44
10	49	134	341	233	140	317	911	651	231	90	40	41
11	48	131	346	227	130	319	777	621	222	78	57	41
12	47	143	340	211	120	336	689	595	202	70	55	39
13	48	143	320	198	120	349	670	567	182	63	55	38
14	45	134	300	191	130	360	947	542	162	60	52	36
15	45	136	283	180	140	358	880	518	142	57	49	34
16	44	142	260	160	160	344	753	482	125	54	47	39
17	43	149	250	150	204	325	705	440	112	52	43	41
18	43	154	235	145	200	312	693	398	104	52	42	41
19	43	156	231	140	211	319	674	407	97	52	41	46
20	43	204	233	140	236	306	658	401	91	51	40	65
21	44	189	229	140	252	291	639	349	85	56	41	103
22	43	170	220	135	264	278	610	372	79	87	71	78
23	44	172	236	135	291	278	577	398	75	65	54	70
24	44	185	276	135	293	281	546	352	70	57	51	63
25	44	189	466	135	286	278	508	352	67	52	48	58
26	44	193	428	135	291	276	472	352	64	49	45	55
27	44	202	352	140	281	301	437	338	74	46	43	51
28	45	209	372	140	278	469	482	330	245	45	42	48
29	44	227	372	140	---	459	488	355	220	55	40	46
30	44	229	377	150	---	422	447	341	174	64	40	45
31	43	---	386	160	---	440	---	327	---	60	42	---
TOTAL	1688	4487	9837	6517	6013	9766	19435	15539	5247	2871	1486	1457
MEAN	54.5	150	317	210	215	315	648	501	175	92.6	47.9	48.6
MAX	104	229	466	398	300	469	947	1080	304	218	71	103
MIN	43	68	218	135	120	227	437	327	64	45	39	34
CFSM	.19	.53	1.13	.75	.77	1.12	2.31	1.78	.62	.33	.17	.17
IN.	.22	.59	1.30	.86	.80	1.29	2.57	2.06	.69	.38	.20	.19

CAL YR 1982 TOTAL 72428 MEAN 198 MAX 2000 MIN 30 CFSM .71 IN 9.59
WTR YR 1983 TOTAL 84343 MEAN 231 MAX 1080 MIN 34 CFSM .82 IN 11.17

04115000 MAPLE RIVER AT MAPLE RAPIDS, MI

LOCATION.--Lat 43°06'35", long 84°41'35", in sec.5, T.8 N., R.3 W., Clinton County, Hydrologic Unit 04050005, on right bank at downstream side of bridge on Maple Road at Maple Rapids, 50 ft upstream from Pine Creek, and 0.8 mi upstream from Hayworth Creek. Records include flow of Pine Creek.

DRAINAGE AREA.--434 mi^2.

PERIOD OF RECORD.--August 1944 to current year.

REVISED RECORDS.--WSP 1707: 1956.

GAGE.--Water-stage recorder. Datum of gage is 642.58 ft National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Prior to Oct. 4, 1968, nonrecording gage at same site and datum.

REMARKS.--Records good. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--39 years, 256 ft^3/s, 8.01 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 6,500 ft^3/s Mar. 20, 1948; maximum gage height, 11.22 ft Mar. 20, 1948, from floodmark, backwater from ice; minimum discharge, 4.4 ft^3/s Aug. 13, 1965, gage height, 1.62 ft.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood in March 1904 reached a stage of 13.8 ft, from information by local resident.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,950 ft^3/s May 4, gage height, 8.79 ft; minimum, 13 ft^3/s Sept. 14, 15, gage height, 1.72 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	51	50	273	845	201	377	1020	709	508	184	57	17
2	47	65	287	749	208	357	1350	1250	495	179	56	16
3	43	99	404	661	272	342	1690	1830	479	155	47	18
4	43	105	637	581	296	332	1890	1940	521	128	45	18
5	42	110	864	520	311	327	1910	1830	558	109	40	17
6	40	123	1150	468	303	323	1760	1630	562	90	37	20
7	36	106	1350	421	282	345	1580	1440	541	74	35	18
8	33	90	1310	386	255	399	1440	1450	508	64	30	19
9	32	79	1140	353	224	502	1320	1470	464	62	27	17
10	29	78	980	328	195	605	1470	1350	431	56	23	16
11	28	86	861	312	171	665	1600	1200	393	51	24	17
12	28	145	737	299	144	670	1590	1040	357	47	29	16
13	28	204	644	285	123	638	1480	928	323	41	33	14
14	25	221	565	272	112	590	1590	818	289	38	34	13
15	29	220	508	253	161	544	1820	730	256	39	33	13
16	27	208	464	239	223	499	1820	650	224	39	28	17
17	25	193	421	213	288	453	1660	577	197	38	24	23
18	24	173	390	199	334	415	1460	511	168	39	24	37
19	42	150	368	174	365	393	1280	462	139	37	21	60
20	53	165	356	149	394	396	1100	476	119	34	22	70
21	50	220	357	125	421	405	971	497	104	32	21	133
22	55	251	354	110	435	391	883	516	93	29	24	163
23	68	265	348	106	453	378	789	578	81	25	27	139
24	55	273	380	104	473	369	705	628	71	24	26	105
25	45	278	546	108	475	361	627	655	63	22	25	83
26	39	273	889	111	456	354	564	666	57	22	26	76
27	49	259	1100	110	430	355	510	652	62	19	26	71
28	69	243	1140	95	403	411	480	601	117	19	26	60
29	59	237	1130	91	---	544	464	536	181	27	22	54
30	53	256	1040	118	---	703	527	505	183	37	20	48
31	49	---	952	184	---	847	---	501	---	45	19	---
TOTAL	1296	5225	21945	8969	8408	14290	37350	28626	8544	1805	931	1388
MEAN	41.8	174	708	289	300	461	1245	923	285	58.2	30.0	46.3
MAX	69	278	1350	845	475	847	1910	1940	562	184	57	163
MIN	24	50	273	91	112	323	464	462	57	19	19	13
CFSM	.10	.40	1.63	.67	.69	1.06	2.87	2.13	.66	.13	.07	.11
IN.	.11	.45	1.88	.77	.72	1.22	3.20	2.45	.73	.15	.08	.12

CAL YR 1982 TOTAL 108900 MEAN 298 MAX 4240 MIN 24 CFSM .69 IN 9.33
WTR YR 1983 TOTAL 138777 MEAN 380 MAX 1940 MIN 13 CFSM .88 IN 11.90

04116000 GRAND RIVER AT IONIA, MI

LOCATION.--Lat 42°58'20", long 85°04'13", in NW1/4 sec.30, T.7 N., R.6 W., Ionia County, Hydrologic Unit 04050006, on left bank 15 ft downstream from bridge on State Highway 66 at Ionia, 2.7 mi downstream from Prairie Creek, and at mile 87.

DRAINAGE AREA.--2,840 mi^2, approximately.

PERIOD OF RECORD.--March to June 1931, July and September 1931 (fragmentary), July 1951 to current year. Gage-height records for flood seasons collected in this vicinity 1907-28 are contained in reports of U.S. Weather Bureau.

GAGE.--Water-stage recorder. Datum of gage is 615.38 ft National Geodetic Vertical Datum of 1929. Mar. 19 to Sept. 24, 1931, nonrecording gage at site 1.5 mi upstream at different datum.

REMARKS.--Records good. Diurnal fluctuation below about 5,000 ft^3/s caused by powerplants above station. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--32 years (water years 1952-83), 1,899 ft^3/s, 9.08 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 21,500 ft^3/s Apr. 1, 1960, gage height, 23.43 ft; minimum, 40 ft^3/s May 13, 1968, gage height, 5.61 ft; minimum daily, 109 ft^3/s July 16, 1977.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 10,500 ft^3/s May 4, gage height, 19.26 ft;minimum, 249 ft^3/s Sept. 15, gage height, 6.83 ft;minimum daily, 367 ft^3/s Sept. 10.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	930	573	2270	4170	1810	2230	5930	5000	3240	2370	1050	452
2	842	1000	2270	3820	1850	2480	6420	6930	3170	2430	885	687
3	885	1090	3140	3420	2490	2270	7740	9930	2860	1760	866	438
4	839	1140	4480	3180	2960	2140	8680	10400	3010	1810	831	433
5	804	1410	4850	2740	2630	2070	8570	9520	3300	1580	908	425
6	505	1350	5600	3070	2110	2290	7880	8460	3340	1240	992	464
7	511	1150	5950	2390	2240	2230	7090	7600	3380	1070	947	600
8	806	1220	5510	2350	1920	2770	6620	6910	3260	1150	792	773
9	504	1220	4900	2280	1530	4030	6310	6900	3120	1090	769	714
10	518	1190	4320	2340	1820	4500	7380	6910	3030	894	729	367
11	541	1500	3810	2080	1470	4030	8500	6540	2800	867	571	459
12	806	1630	3440	2100	1370	3890	8390	6030	2510	869	1080	548
13	513	1730	2910	2080	1260	3720	7770	5410	2280	816	853	509
14	515	1750	2890	1950	1260	3480	7930	4880	2290	773	822	496
15	797	1780	2620	1850	1640	3270	9590	4440	1950	540	808	378
16	505	1730	2570	1650	1800	3160	9890	4000	1870	581	795	559
17	500	1590	2630	1500	2270	2770	9180	3660	1660	530	784	572
18	502	1490	2610	1450	2350	2830	8210	3410	1680	840	779	756
19	474	1450	2400	1400	2240	2760	7330	3380	1460	1030	758	610
20	804	1660	2360	1350	2520	2880	6580	3830	1280	783	699	924
21	537	2040	2330	1350	2430	3140	5920	3780	1330	523	447	1410
22	497	2060	2460	1300	2590	3090	5430	3620	1030	820	518	1220
23	831	2090	2380	1300	2960	3030	5030	4250	968	1200	1020	1220
24	533	2180	2700	1300	2950	2840	4600	4370	930	800	795	1040
25	525	2260	4350	1300	2960	2700	4310	4130	902	497	498	984
26	544	2130	6200	1300	3050	2700	4030	4020	883	773	482	656
27	818	2140	6310	1350	2640	2810	3670	3840	900	765	758	904
28	540	2170	5930	1400	2700	3460	3450	3580	1500	505	437	608
29	842	2090	5470	1400	---	5080	4140	3570	2230	808	436	862
30	549	2070	5090	1710	---	5660	4400	3460	2210	827	736	804
31	461	---	4600	2150	---	5790	---	3430	---	978	377	---
TOTAL	19778	48883	119350	63030	61820	100100	200970	166190	64373	31519	23222	20872
MEAN	638	1629	3850	2033	2208	3229	6699	5361	2146	1017	749	696
MAX	930	2260	6310	4170	3050	5790	9890	10400	3380	2430	1080	1410
MIN	461	573	2270	1300	1260	2070	3450	3380	883	497	377	367
CFSM	.23	.57	1.36	.72	.78	1.14	2.36	1.89	.76	.36	.26	.25
IN.	.26	.64	1.56	.83	.81	1.31	2.63	2.18	.84	.41	.30	.27

CAL YR 1982 TOTAL 835857 MEAN 2290 MAX 18200 MIN 446 CFSM .81 IN 10.95
WTR YR 1983 TOTAL 920107 MEAN 2521 MAX 10400 MIN 367 CFSM .89 IN 12.05

04116500 FLAT RIVER AT SMYRNA, MI

LOCATION.--Lat 43°03'10", long 85°15'50", in NW1/4 sec.28, T.8 N., R.8 W., Ionia County, Hydrologic Unit 04050006, on right bank at downstream side of highway bridge, and 0.5 mi south of Smyrna.

DRAINAGE AREA.--528 mi^2.

PERIOD OF RECORD.--October 1950 to current year. Monthly discharge only for some periods, published in WSP 1727.

GAGE.--Water-stage recorder. Datum of gage is 729.53 ft National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources).

REMARKS.--Records good. Diurnal fluctuation caused by powerplants above station prior to September 1956; occasional diurnal fluctuation since. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--33 years, 432 ft^3/s, 11.11 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,100 ft^3/s Apr. 22, 1967, gage height, 7.27 ft, caused by momentary release of water from storage above station; maximum gage height, 8.26 ft Feb. 6, 1974, backwater from ice; minimum discharge, 7.4 ft^3/s Sept. 9, 1953; minimum daily, 70 ft^3/s Sept. 6, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,340 ft^3/s Dec. 7, gage height, 5.60 ft;minimum, 61 ft^3/s July 22, gage height, 2.94 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	257	315	546	804	418	519	747	684	658	290	253	201
2	364	473	714	762	427	506	810	950	640	280	255	195
3	276	531	990	668	491	503	912	960	633	258	240	186
4	258	562	1020	613	495	517	947	945	666	248	232	177
5	263	562	1170	655	467	535	956	899	659	243	228	171
6	265	550	1310	618	469	571	947	853	640	235	222	208
7	269	543	1330	582	438	637	927	825	601	220	212	224
8	259	509	1320	555	423	738	891	891	557	215	198	223
9	253	475	1240	535	412	798	881	883	526	212	198	208
10	261	489	1130	550	394	780	927	878	499	204	194	200
11	267	538	1020	597	360	738	927	860	460	174	269	222
12	271	620	862	607	376	733	910	818	428	188	299	213
13	277	632	845	601	388	714	919	759	367	182	276	205
14	269	631	771	578	391	682	1140	699	381	177	248	201
15	262	609	731	562	396	639	1200	650	364	173	235	196
16	256	585	705	402	415	598	1250	604	356	170	227	223
17	256	557	642	390	491	565	1230	570	336	168	218	250
18	253	527	630	370	550	549	1190	536	319	202	211	511
19	256	487	617	360	577	630	1110	600	303	209	205	525
20	286	541	622	360	603	673	1010	703	293	192	190	545
21	314	577	616	360	625	714	923	727	282	194	184	544
22	324	599	600	350	647	696	846	711	271	178	251	494
23	315	614	595	350	673	693	779	708	262	175	256	458
24	303	606	643	350	674	666	719	690	252	176	243	415
25	292	588	858	350	647	633	667	689	241	173	226	383
26	290	571	916	350	603	615	584	664	231	171	220	385
27	286	541	920	353	568	624	593	633	251	156	215	385
28	279	522	945	380	538	680	602	592	341	170	206	368
29	276	536	930	407	---	716	619	587	326	233	200	347
30	271	543	881	413	---	731	676	605	305	267	203	326
31	269	---	851	428	---	739	---	652	---	250	202	---
TOTAL	8597	16433	26970	15260	13956	20132	26839	22825	12448	6383	7016	9189
MEAN	277	548	870	492	498	649	895	736	415	206	226	306
MAX	364	632	1330	804	674	798	1250	960	666	290	299	545
MIN	253	315	546	350	360	503	584	536	231	156	184	171
CFSM	.53	1.04	1.65	.93	.94	1.23	1.70	1.39	.79	.39	.43	.58
IN.	.61	1.16	1.90	1.08	.98	1.42	1.89	1.61	.88	.45	.49	.65

CAL YR 1982 TOTAL 178898 MEAN 490 MAX 1760 MIN 150 CFSM .93 IN 12.60
WTR YR 1983 TOTAL 186048 MEAN 510 MAX 1330 MIN 156 CFSM .97 IN 13.11

04117500 THORNAPPLE RIVER NEAR HASTINGS, MI

LOCATION.--Lat 42°36'57", long 85°14'11", in SE1/4 sec.27, T.3 N., R.8 W., Barry County, Hydrologic Unit 04050007, on downstream side of highway bridge, 0.6 mi downstream from Cedar Creek, 2.0 mi downstream from Thornapple Lake, and 3.2 mi southeast of Hastings.

DRAINAGE AREA.--385 mi^2.

PERIOD OF RECORD.--October 1944 to current year.

GAGE.--Water-stage recorder. Datum of gage is 786.71 ft National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Prior to Oct. 1, 1965, nonrecording gage at same site and datum.

REMARKS.--Records good. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--39 years, 314 ft^3/s, 11.08 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 6,810 ft^3/s Apr. 7, 1947, gage height, 10.20 ft, from graph based on gage readings; minimum, 33 ft^3/s Aug. 10, 1964, gage height, 2.71 ft.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,010 ft^3/s May 4, gage height, 6.59 ft; minimum discharge, 93 ft^3/s Aug. 9, 10; minimum gage height, 2.95 ft Oct. 18, Sept. 15.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	136	141	313	710	309	329	1230	715	446	239	143	117
2	131	214	305	585	293	317	1300	1150	419	233	136	112
3	124	250	424	490	406	309	1490	1700	392	222	126	109
4	119	250	680	415	520	309	1650	1990	406	200	121	107
5	117	228	878	365	510	313	1590	1920	433	179	117	105
6	112	206	980	334	442	317	1440	1680	451	164	112	141
7	112	190	1010	317	361	356	1310	1420	433	148	107	156
8	114	179	968	309	297	442	1180	1210	397	138	100	146
9	114	177	866	297	264	580	1070	1030	347	136	97	133
10	112	195	735	293	242	690	1080	884	313	136	95	124
11	112	217	600	321	219	720	1230	785	285	131	114	121
12	112	244	480	347	203	670	1350	690	271	126	143	117
13	112	278	392	343	206	570	1390	595	253	121	148	109
14	112	278	334	321	211	485	1540	520	233	117	138	109
15	112	253	305	297	230	424	1850	465	217	109	126	107
16	107	230	329	250	274	374	1870	424	206	102	117	124
17	100	214	361	236	356	338	1730	388	195	102	112	148
18	97	200	361	208	419	321	1520	356	187	107	109	148
19	102	195	347	203	424	370	1310	370	179	109	105	172
20	109	230	361	206	424	455	1110	520	172	107	100	203
21	121	313	370	198	442	520	926	605	161	102	105	329
22	124	356	370	195	455	505	780	610	156	124	161	397
23	124	347	361	200	475	480	675	620	146	136	172	379
24	121	334	419	208	505	465	585	635	143	138	159	325
25	117	325	615	214	505	446	515	645	138	131	141	271
26	114	305	956	211	455	428	465	615	136	119	131	236
27	117	281	1170	198	392	433	424	540	138	112	126	211
28	117	264	1190	195	352	590	428	465	174	119	121	195
29	114	278	1150	195	---	860	515	428	214	138	117	179
30	117	305	1030	208	---	1080	620	446	236	143	114	166
31	119	---	860	274	---	1180	---	455	---	146	119	---
TOTAL	3571	7477	19520	9143	10191	15676	34173	24876	7877	4334	3832	5296
MEAN	115	249	630	295	364	506	1139	802	263	140	124	177
MAX	136	356	1190	710	520	1180	1870	1990	451	239	172	397
MIN	97	141	305	195	203	309	424	356	136	102	95	105
CFSM	.30	.65	1.64	.77	.95	1.31	2.96	2.08	.68	.36	.32	.46
IN.	.35	.72	1.89	.88	.98	1.51	3.30	2.40	.76	.42	.37	.51

CAL YR 1982 TOTAL 138730 MEAN 380 MAX 4120 MIN 97 CFSM .99 IN 13.40
WTR YR 1983 TOTAL 145966 MEAN 400 MAX 1990 MIN 95 CFSM 1.04 IN 14.10

04119000 GRAND RIVER AT GRAND RAPIDS, MI

LOCATION.--Lat 42°57'52", long 85°40'35", in NE1/4 sec.25, T.7 N., R.12 W., Kent County, Hydrologic Unit 04050006, on right bank 500 ft upstream from bridge on Fulton Street, 1.7 mi upstream from Plaster Creek, and at mile 41.

DRAINAGE AREA.--4,900 mi^2, approximately.

PERIOD OF RECORD.--March 1901 to December 1905, January 1906 to August 1918 (gage heights only). October 1930 to current year. Monthly discharge only for some periods, published in WSP 1307. Gage-height records collected in this vicinity since 1907 are contained in reports of U.S. Weather Bureau.

REVISED RECORDS.--WSP 924: 1938(M). WSP 1387: 1901-5, 1940.

GAGE.--Water stage recorder. Datum of gage is 585.70 ft National Geodetic Vertical Datum of 1929 (levels by City of Grand Rapids). March 1901 to August 1918, nonrecording gage at Fulton Street Bridge 500 ft downstream and Oct. 1, 1930 to Oct. 26, 1953, water-stage recorder at sewage pumping station 1 mi downstream at datum 2.99 ft higher.

REMARKS.--Records good. Moderate diurnal fluctuation at low and medium flow caused by powerplants above station. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--57 years, 3,572 ft^3/s, 9.90 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge,54,000 ft^3/s Mar. 28, 1904, gage height, 19.5 ft,from graph based on gage readings, site then in use; minimum daily, 381 ft^3/s Aug. 9, 17, 1936.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum discharge since at least 1901, 54,000 ft^3/s Mar. 28, 1904.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 14,800 ft^3/s Apr. 17, gage height, 13.81 ft; minimum, 1,100 ft^3/s Sept. 5, gage height, 2.79 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2010	1680	4320	8360	4230	4900	9060	7340	5730	3590	2020	1330
2	1880	1820	5140	7480	4360	4700	9570	9230	5580	3630	1980	1260
3	1910	2210	7650	6830	4890	4500	10500	10800	5500	3550	1840	1490
4	1820	2410	8950	6040	5330	4400	11300	12200	5430	2960	1790	1310
5	1800	2540	9860	5590	5410	4400	12100	13700	5520	2760	1740	1220
6	1650	3030	10700	5340	5250	4400	12600	14500	5630	2550	1760	1370
7	1560	2910	10800	5370	4780	4800	12400	14000	5590	2240	1850	1450
8	1560	2730	10700	4930	4730	5400	11700	13100	5510	2030	1800	1550
9	1720	2720	10200	4700	4130	5900	10900	11900	5300	2070	1600	1780
10	1580	2730	9290	4620	3600	6770	10600	10600	5110	1990	1490	1680
11	1510	2960	8210	4810	2960	7100	10700	10200	4910	1850	1490	1590
12	1480	3910	7100	4650	2770	6770	11300	9760	4600	1790	1550	1390
13	1830	4020	6230	4670	2780	6510	11900	9190	4170	1740	1770	1450
14	1610	3950	5670	4520	2990	6230	13100	8350	3770	1680	1730	1420
15	1500	3890	5630	4340	2950	5840	13800	7540	3880	1680	1740	1360
16	1710	3850	5240	4010	3530	5530	14200	6800	3260	1470	1700	1370
17	1440	3650	5170	3230	4260	5300	14700	6170	3060	1350	1740	1470
18	1420	3240	5060	2550	4860	5000	14500	5710	2940	1410	1730	2120
19	1500	3100	4980	2600	4910	5470	13700	5700	2780	1660	1610	2310
20	1590	3440	4900	2500	4900	5490	12500	6050	2440	1870	1550	2380
21	1760	3900	4850	2500	5000	5600	11300	6370	2370	1690	1620	2690
22	1660	4350	4800	2500	5300	5770	10300	6390	2360	1590	1560	3250
23	1610	4370	4830	2500	5600	5720	9130	6450	2080	1820	1590	3050
24	1710	4500	5110	2500	5800	5600	8250	6780	2000	1910	1870	2800
25	1580	4480	6860	2500	5800	5350	7370	6860	1990	1670	1780	2570
26	1540	4410	9050	2600	5600	5150	6650	6680	1860	1360	1420	2370
27	1560	4220	9850	2700	5400	5240	6340	6400	1980	1500	1420	2020
28	1900	4120	10400	2800	5200	5930	5910	6080	2240	1560	1570	2160
29	1960	4390	10500	3000	---	7060	5740	5990	2880	1620	1380	1950
30	1840	4400	9930	3530	---	8170	6640	5880	3680	1810	1280	2000
31	1630	---	9190	3830	---	8730	---	5840	---	1960	1520	---
TOTAL	51830	103930	231170	128100	127320	177730	318760	262560	114150	62360	51490	56160
MEAN	1672	3464	7457	4132	4547	5733	10630	8470	3805	2012	1661	1872
MAX	2010	4500	10800	8360	5800	8730	14700	14500	5730	3630	2020	3250
MIN	1420	1680	4320	2500	2770	4400	5740	5700	1860	1350	1280	1220
CFSM	.34	.71	1.52	.84	.93	1.17	2.17	1.73	.78	.41	.34	.38
IN.	.39	.79	1.76	.97	.97	1.35	2.42	1.99	.87	.47	.39	.43

CAL YR 1982 TOTAL 1547350 MEAN 4239 MAX 26500 MIN 1300 CFSM .87 IN 11.75
WTR YR 1983 TOTAL 1685560 MEAN 4618 MAX 14700 MIN 1220 CFSM .94 IN 12.80

04119300 GRAND RIVER AT EASTMANVILLE, MI
(National stream-quality accounting network station)

LOCATION.--Lat 43°00'53", long 85°57'21", in NE1/4 NW1/4 sec.10, T.7 N., R.14 W., Ottawa County, Hydrologic Unit 04050006. at bridge on 68th Avenue in Eastmanville. 1.1 mi downstream from Deer Creek, and at mile 19.3.

DRAINAGE AREA.--5,230 mi^2, approximately.

PERIOD OF RECORD.--February 1979 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: February 1979 to current year.
WATER TEMPERATURES: February 1979 to current year.

INSTRUMENTATION.--Water-quality monitor since October 1980.

REMARKS.--Bimonthly samples were collected at bridge.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum daily, 1,100 micromhos Mar. 2, 1979; minimum observed, 324 micromhos Mar. 24, 1982.
WATER TEMPERATURES: Maximum, 28.5°C July 21, 1983; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum, 28.5°C July 21; minimum, 0.0°C on many days during winter period.

WATER QUALITY DATA, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DATE	TIME	STREAM-FLOW, INSTANTANEOUS (CFS)	SPECIFIC CONDUCTANCE (UMHOS)	PH (STANDARD UNITS)	TEMPERATURE (DEG C)	TURBIDITY (NTU)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)	COLIFORM, FECAL, 0.7 UM-MF (COLS./100 ML)	STREPTOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)
NOV 16...	1300	3920	596	7.7	4.0	4.6	11.9	92	K2700	K670
DEC 28...	1300	10800	483	7.7	6.0	57	10.6	88	>670	>1000
MAR 22...	1220	6250	595	8.3	4.0	3.6	12.8	98	1100	490
APR 05...	1130	13000	470	7.1	6.0	20	12.5	101	680	>2000
JUN 14...	1230	4170	666	8.6	24.0	15	10.6	127	190	110
SEP 13...	1230	1590	551	8.4	22.0	6.5	9.2	106	--	630

DATE	HARDNESS (MG/L AS CACO3)	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	PERCENT SODIUM	SODIUM ADSORPTION RATIO	POTASSIUM, DISSOLVED (MG/L AS K)	ALKALINITY LAB (MG/L AS CACO3)	CARBON DIOXIDE DISSOLVED (MG/L AS CO2)
NOV 16...	281	76	22	21	14	.6	3.4	210	8.1
DEC 28...	224	60	18	13	11	.4	3.4	162	6.2
MAR 22...	270	75	20	16	11	.4	2.4	205	2.0
APR 05...	229	62	18	11	9	.3	2.8	162	25
JUN 14...	294	80	23	20	13	.5	2.2	230	1.1
SEP 13...	242	59	23	29	20	.8	2.5	175	1.3

DATE	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, DISSOLVED (MG/L AS F)	SILICA, DISSOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	SOLIDS, DISSOLVED (TONS PER AC-FT)	SOLIDS, DISSOLVED (TONS PER DAY)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N)
NOV 16...	56	36	.2	9.3	374	351	.51	3960	1.4
DEC 28...	48	25	.1	8.3	--	273	.37	7970	2.6
MAR 22...	57	36	.2	4.9	375	335	.51	6330	1.7
APR 05...	46	26	.1	5.0	314	269	.43	11000	3.0
JUN 14...	53	39	.3	3.1	383	359	.52	4310	.93
SEP 13...	60	47	.3	2.9	395	329	.54	1700	.49

04119300 GRAND RIVER AT EASTMANVILLE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DATE	NITROGEN, AMMONIA DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS, DISSOLVED (MG/L AS P)	PHOSPHORUS, ORTHO, DISSOLVED (MG/L AS P)	PHOSPHATE, ORTHO, DISSOLVED (MG/L AS PO4)	SEDIMENT, SUSPENDED (MG/L)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
NOV 16...	.270	.90	.070	.040	.040	.12	16	169	100
DEC 28...	.140	.80	.220	.090	.070	.21	84	2450	100
MAR 22...	.190	.70	.040	.030	.020	.06	13	219	94
APR 05...	.130	.70	.110	.030	.030	.09	42	1470	80
JUN 14...	.050	1.50	.080	.060	.010	.03	30	338	97
SEP 13...	<.010	.70	.080	.010	<.010	--	38	163	99

DATE	TIME	ALUMINUM, DISSOLVED (UG/L AS AL)	ARSENIC DISSOLVED (UG/L AS AS)	BARIUM, DISSOLVED (UG/L AS BA)	BERYLLIUM, DISSOLVED (UG/L AS BE)	CADMIUM DISSOLVED (UG/L AS CD)	CHROMIUM, DISSOLVED (UG/L AS CR)	COBALT, DISSOLVED (UG/L AS CO)	COPPER, DISSOLVED (UG/L AS CU)	IRON, DISSOLVED (UG/L AS FE)	LEAD, DISSOLVED (UG/L AS PB)
NOV 16...	1300	20	2	57	<1	<1	4	<3	3	82	<1
MAR 22...	1220	30	1	48	<1	<1	1	<3	3	54	11
APR 05...	1130	<10	1	43	<1	2	<1	3	2	41	4
SEP 13...	1230	10	2	60	<1	<1	<1	<3	3	7	2

DATE	LITHIUM DISSOLVED (UG/L AS LI)	MANGANESE, DISSOLVED (UG/L AS MN)	MERCURY DISSOLVED (UG/L AS HG)	MOLYBDENUM, DISSOLVED (UG/L AS MO)	NICKEL, DISSOLVED (UG/L AS NI)	SELENIUM, DISSOLVED (UG/L AS SE)	SILVER, DISSOLVED (UG/L AS AG)	STRONTIUM, DISSOLVED (UG/L AS SR)	VANADIUM, DISSOLVED (UG/L AS V)	ZINC, DISSOLVED (UG/L AS ZN)
NOV 16...	11	12	.1	20	6	<1	<1	260	<6.0	<4
MAR 22...	7	9	<.1	<10	2	<1	<1	210	<6.0	4
APR 05...	37	6	.1	<10	4	<1	<1	150	<6.0	48
SEP 13...	<4	2	.1	<10	5	<1	<1	330	<6.0	5

04119300 GRAND RIVER AT EASTMANVILLE, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	---	---	---				---	---	---	560	520	543
2	---	---	---				---	---	---	560	530	546
3	---	---	---				---	---	---	570	520	545
4	---	---	---				490	470	477	590	530	564
5	---	---	---				490	460	477	590	580	588
6	600	585	594				470	460	463	600	560	582
7	604	592	597				480	430	459	620	600	608
8	596	587	591				460	440	451	610	590	599
9	597	585	589				470	450	462	620	560	594
10	597	572	583				480	460	470	630	600	615
11	577	573	575				500	440	469	630	620	623
12	582	573	576				530	430	474	630	620	623
13	607	580	594				600	520	571	620	610	617
14	603	588	596				590	550	582	630	610	618
15	603	591	599				610	580	601	640	620	634
16	609	594	598				600	540	573	640	610	620
17	602	595	598				530	470	490	630	590	620
18	612	600	606				620	460	528	690	560	606
19	624	612	619				630	610	623	720	690	697
20	622	602	609				630	560	596	720	700	713
21	612	587	601				570	480	510	710	700	707
22	588	585	586				630	470	510	710	700	701
23	603	586	591				660	600	630	710	700	703
24	609	592	599				660	640	652	700	690	700
25	---	---	---				650	540	603	720	690	700
26	---	---	---				560	530	548	720	700	705
27	---	---	---				550	530	544	710	690	698
28	---	---	---				530	490	510	710	690	698
29	---	---	---				520	510	515	710	690	703
30	---	---	---				520	510	514	720	690	701
31	---	---	---				540	510	525	720	660	685
MONTH										720	520	641

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1				---	---	---	570	550	558	---	---	---
2				---	---	---	550	530	543	---	---	---
3				---	---	---	550	520	533	---	---	---
4				---	---	---	520	500	512	---	---	---
5				---	---	---	510	480	495	---	---	---
6				---	---	---	490	480	482	---	---	---
7				---	---	---	500	480	488	---	---	---
8				---	---	---	510	490	500	---	---	---
9				---	---	---	520	500	513	---	---	---
10				---	---	---	520	510	517	---	---	---
11				---	---	---	520	500	509	---	---	---
12				---	---	---	510	480	492	---	---	---
13				---	---	---	480	470	479	---	---	---
14				---	---	---	490	450	464	---	---	---
15				---	---	---	460	440	453	---	---	---
16				---	---	---	460	440	453	---	---	---
17				---	---	---	460	440	446	540	500	520
18				---	---	---	450	440	445	550	530	542
19				---	---	---	470	450	459	570	550	560
20				---	---	---	490	470	478	560	540	550
21				---	---	---	500	490	497	560	540	552
22				---	---	---	510	500	503	560	540	552
23				660	590	626	530	500	514	560	550	552
24				620	590	608	530	520	528	---	---	---
25				600	590	597	540	520	534	---	---	---
26				600	590	597	560	520	543	---	---	---
27				610	600	604	570	560	562	---	---	---
28				630	590	612	570	560	568	---	---	---
29				590	570	584	570	540	559	---	---	---
30				580	560	574	---	---	---	---	---	---
31				580	560	568	---	---	---	---	---	---
MONTH												

04119300 GRAND RIVER AT EASTMANVILLE, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	---	---	---	660	618	642	559	519	536	632	602	615
2	---	---	---	688	662	675	600	557	577	613	599	606
3	582	568	576	671	634	656	603	568	584	640	610	623
4	577	554	565	644	601	625	613	588	598	647	602	626
5	568	559	564	644	577	617	627	592	606	610	584	600
6	572	563	567	620	582	604	636	606	618	611	585	594
7	578	573	576	622	602	614	636	603	616	589	550	571
8	589	579	583	649	611	631	609	584	594	602	576	583
9	595	586	592	649	619	631	621	574	590	602	577	587
10	628	595	602	650	609	627	628	599	613	599	569	582
11	615	597	606	607	597	603	625	597	610	597	549	579
12	616	601	608	654	603	627	622	588	607	554	508	526
13	618	604	611	654	623	638	635	609	620	577	555	565
14	637	622	631	649	616	630	619	580	593	580	572	576
15	665	635	647	645	614	629	586	579	582	597	584	589
16	656	635	645	649	612	632	585	568	577	612	591	601
17	669	645	658	652	612	633	584	557	570	629	614	621
18	671	655	664	654	615	635	594	565	575	640	616	631
19	667	644	656	637	615	624	606	574	585	635	624	629
20	657	644	650	643	611	627	614	598	606	624	596	605
21	679	650	666	626	596	610	618	601	607	596	575	585
22	681	659	669	634	607	623	604	546	581	580	568	575
23	672	649	660	626	560	586	571	496	521	575	570	571
24	688	654	669	612	588	601	590	563	574	579	564	572
25	701	664	679	606	583	590	589	562	575	577	566	573
26	699	655	670	640	583	602	599	558	572	576	561	567
27	666	638	650	678	641	654	632	586	601	583	541	568
28	650	627	641	681	615	635	645	599	620	599	573	586
29	622	600	607	634	577	597	617	584	596	614	599	605
30	626	604	612	615	514	555	604	579	584	628	616	621
31	---	---	---	615	506	565	629	605	617	---	---	---
MONTH				688	506	620	645	496	590	647	508	591

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	18.5	17.0	18.0	11.5	11.0	11.5	5.5	4.0	4.5	2.0	1.5	1.5
2	18.5	17.0	17.5	12.0	11.5	12.0	8.0	5.5	6.5	1.5	1.0	1.5
3	18.5	17.5	18.0	12.0	10.5	11.5	10.0	8.5	9.5	1.0	1.0	1.0
4	18.0	16.5	17.5	10.5	8.5	9.5	10.0	9.5	9.5	1.0	.5	.5
5	18.5	17.0	17.5	8.5	6.5	7.5	9.5	9.5	9.5	1.0	.5	1.0
6	19.0	17.5	18.5	6.5	5.5	6.0	9.5	8.5	9.0	1.0	1.0	1.0
7	19.0	17.5	18.0	6.5	5.0	6.0	8.5	7.0	8.0	1.0	1.0	1.0
8	18.0	16.5	17.5	7.5	6.0	6.5	7.0	5.5	6.5	1.0	1.0	1.0
9	17.0	15.5	16.0	7.0	7.0	7.0	5.5	4.0	4.5	1.0	1.0	1.0
10	17.0	16.0	16.5	8.0	6.5	7.0	4.0	2.5	3.0	2.0	1.0	1.5
11	16.5	15.0	15.5	8.5	7.5	8.0	2.5	1.5	2.0	2.5	2.0	2.0
12	15.0	14.5	14.5	9.0	8.0	8.5	1.5	1.0	1.0	2.0	1.5	1.5
13	14.5	13.5	14.0	8.0	6.5	7.5	1.0	.5	.5	1.0	1.0	1.0
14	13.5	13.0	13.5	6.5	5.0	6.0	.5	.5	.5	1.0	1.0	1.0
15	13.5	12.0	13.0	5.0	4.5	4.5	1.5	1.0	1.0	1.0	.0	.5
16	12.0	11.0	11.5	4.5	3.5	4.0	1.5	1.5	1.5	.0	.0	.0
17	11.0	9.5	10.5	4.5	3.5	4.0	1.5	1.0	1.0	.0	.0	.0
18	11.5	9.5	10.5	4.5	3.5	4.0	1.0	.5	1.0	.0	.0	.0
19	12.0	10.5	11.5	6.0	4.5	5.0	1.5	1.0	1.5	.0	.0	.0
20	12.0	10.5	11.0	8.0	6.0	6.5	1.5	1.5	1.5	.0	.0	.0
21	10.5	9.5	10.0	8.5	7.5	8.0	2.0	1.5	2.0	.0	.0	.0
22	9.5	9.0	9.5	8.0	7.0	7.5	1.5	1.5	1.5	.0	.0	.0
23	9.5	7.5	8.5	7.5	7.0	7.5	2.5	1.5	2.0	.0	.0	.0
24	9.5	7.5	8.5	7.0	5.5	6.0	4.0	2.5	3.5	.0	.0	.0
25	9.5	7.0	8.5	5.5	4.5	5.0	6.0	4.0	5.0	.0	.0	.0
26	9.5	7.5	8.5	4.5	4.0	4.5	6.0	5.5	6.0	.0	.0	.0
27	9.5	7.5	8.5	4.0	3.0	3.5	6.5	5.5	6.0	.0	.0	.0
28	10.5	9.0	10.0	3.0	3.0	3.0	6.5	5.5	6.0	.0	.0	.0
29	11.0	10.0	10.5	3.5	3.0	3.0	5.5	3.5	4.5	.5	.0	.5
30	11.5	10.0	10.5	4.0	3.5	4.0	3.5	2.5	3.0	1.0	.5	.5
31	11.0	10.5	11.0	---	---	---	2.5	2.0	2.5	.5	.5	.5
MONTH	19.0	7.0	13.0	12.0	3.0	6.5	10.0	.5	4.0	2.5	.0	.5

04119300 GRAND RIVER AT EASTMANVILLE, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	.5	.0	.5	4.5	3.5	4.0	5.5	5.0	5.5	---	---	---
2	.5	.0	.0	5.0	4.0	4.5	5.5	5.0	5.5	---	---	---
3	1.0	.0	.5	6.5	4.5	5.5	5.0	5.0	5.0	---	---	---
4	.0	.0	.0	7.0	6.0	6.5	5.5	5.0	5.0	---	---	---
5	.0	.0	.0	8.0	6.5	7.5	6.0	5.0	5.5	---	---	---
6	.0	.0	.0	9.0	8.0	8.5	6.0	6.0	6.0	---	---	---
7	.5	.0	.0	9.5	8.5	9.0	6.5	6.0	6.5	---	---	---
8	.5	.0	.5	9.5	9.0	9.5	7.0	6.0	6.5	---	---	---
9	.5	.5	.5	9.0	7.5	8.5	7.0	6.5	7.0	---	---	---
10	.5	.0	.0	7.5	6.5	7.0	7.0	6.5	7.0	---	---	---
11	.0	.0	.0	6.5	6.0	6.5	7.0	6.5	7.0	---	---	---
12	.5	.0	.0	6.5	5.5	6.0	7.5	6.5	7.0	---	---	---
13	1.0	.0	.5	6.0	5.5	5.5	8.0	7.5	7.5	---	---	---
14	1.0	.0	.5	6.5	6.0	6.0	9.0	8.0	9.0	---	---	---
15	1.5	1.0	1.0	6.5	6.0	6.0	9.0	8.0	8.5	---	---	---
16	2.5	1.5	2.0	7.0	6.5	6.5	8.0	8.0	8.0	---	---	---
17	2.5	2.0	2.5	7.5	7.0	7.0	7.5	7.0	7.5	15.5	15.0	15.5
18	2.5	2.0	2.0	7.5	7.5	7.5	7.0	6.0	6.5	15.5	15.0	15.0
19	3.0	2.0	2.5	7.5	6.5	7.0	6.0	5.5	5.5	15.5	14.5	15.0
20	3.5	2.5	3.0	6.5	5.5	6.0	6.0	5.0	5.5	15.0	15.0	15.0
21	4.0	3.0	3.5	5.0	3.5	4.5	7.0	6.0	6.0	15.5	14.5	15.0
22	4.0	3.5	4.0	4.0	3.0	3.5	8.5	7.0	7.5	15.5	15.0	15.5
23	4.5	4.0	4.0	3.5	2.5	3.0	10.0	8.5	9.0	15.0	15.0	15.0
24	4.0	3.5	4.0	3.5	2.5	3.0	11.0	9.5	10.5	---	---	---
25	3.5	3.0	3.5	3.5	2.5	3.0	11.5	10.5	11.0	---	---	---
26	3.5	2.5	3.0	3.5	3.0	3.0	12.5	11.5	12.0	---	---	---
27	3.5	2.5	3.0	3.5	3.0	3.0	13.5	12.0	12.5	---	---	---
28	4.0	3.0	3.5	4.0	3.5	3.5	13.5	13.0	13.0	---	---	---
29	---	---	---	4.5	3.5	4.0	13.5	12.5	13.0	---	---	---
30	---	---	---	5.0	4.0	4.5	---	---	---	---	---	---
31	---	---	---	5.5	4.5	5.0	---	---	---	---	---	---
MONTH	4.5	.0	1.5	9.5	2.5	5.5						

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	---	---	---	24.0	22.5	23.5	26.5	25.5	26.0	24.5	24.0	24.5
2	---	---	---	25.0	23.5	24.0	26.5	25.0	25.5	24.5	23.5	24.0
3	15.5	15.5	15.5	26.0	24.0	25.0	26.0	25.0	25.5	24.5	24.0	24.0
4	15.5	15.0	15.0	25.5	24.5	25.0	26.5	25.0	25.5	24.5	23.5	24.0
5	16.0	15.0	15.5	25.0	23.5	24.0	26.0	25.0	25.5	24.5	24.0	24.5
6	16.5	15.5	16.0	23.5	22.0	23.0	27.0	25.0	26.0	24.5	23.5	24.0
7	17.5	16.0	17.0	23.5	21.5	22.5	27.0	25.5	26.5	23.5	22.5	22.5
8	18.0	16.5	17.0	23.0	21.5	22.5	27.0	25.5	26.5	23.0	21.5	22.0
9	19.0	17.0	18.0	24.0	22.0	23.0	26.5	25.0	26.0	23.5	22.0	23.0
10	22.0	18.5	19.0	24.0	22.5	23.5	25.5	24.0	24.5	24.0	23.0	23.5
11	21.5	19.5	20.5	25.5	23.5	24.5	24.0	22.5	23.0	24.0	22.5	23.5
12	23.0	20.5	21.5	26.0	24.5	25.0	23.0	21.0	22.0	22.5	21.5	22.0
13	24.0	21.5	23.0	26.5	24.5	25.5	23.5	21.0	22.5	21.5	20.5	21.0
14	24.5	22.5	23.5	27.0	25.0	26.0	24.0	22.0	23.0	20.5	19.5	19.5
15	24.5	23.5	24.0	27.5	26.0	27.0	24.0	22.5	23.5	19.5	18.0	18.5
16	24.5	23.0	24.0	28.0	26.5	27.5	24.5	23.5	24.0	18.0	17.5	18.0
17	24.0	22.5	23.5	28.0	27.0	27.5	25.0	24.0	24.5	18.0	17.5	18.0
18	24.0	22.0	23.0	27.5	26.5	27.0	25.5	24.5	25.0	19.0	17.5	18.5
19	24.0	22.0	23.0	28.0	26.5	27.0	27.0	25.0	26.0	19.5	18.5	19.0
20	24.5	22.5	23.5	28.0	26.5	27.0	27.0	26.0	26.5	19.5	18.5	19.0
21	25.0	23.5	24.5	28.5	26.5	27.5	26.5	25.5	26.0	18.5	17.0	18.0
22	25.5	24.0	25.0	27.5	26.5	27.5	26.0	24.5	25.5	17.0	15.0	16.0
23	26.0	24.5	25.0	27.5	26.5	27.0	25.0	24.0	24.5	15.0	14.0	14.5
24	26.0	24.5	25.5	27.5	26.0	26.5	24.5	23.5	24.0	15.0	13.5	14.0
25	26.5	24.5	25.5	27.0	26.0	26.5	24.5	24.0	24.0	14.5	14.0	14.0
26	27.0	25.0	26.0	27.5	25.5	26.5	24.5	24.0	24.0	14.0	13.5	14.0
27	26.5	25.0	26.0	27.0	25.5	26.5	25.0	24.0	24.5	15.5	13.5	14.0
28	24.5	22.5	24.0	26.5	25.5	26.0	25.5	24.5	25.0	16.5	15.0	15.5
29	23.0	21.5	22.0	26.5	25.5	26.0	26.0	24.5	25.5	17.5	16.0	17.0
30	23.5	21.5	22.5	27.5	26.0	26.5	25.5	25.0	25.5	18.0	16.5	17.5
31	---	---	---	27.5	26.5	27.0	25.0	24.5	24.5	---	---	---
MONTH	27.0	15.0	21.5	28.5	21.5	25.5	27.0	21.0	25.0	24.5	13.5	19.5

04121300 CLAM RIVER AT VOGEL CENTER, MI

LOCATION.--Lat 44°12'02", long 85°03'10", in SW1/4 NW1/4 sec.21, T.21 N., R.6 W., Missaukee County, Hydrologic Unit 04060102, on left bank 10 ft downstream from bridge on county road, 0.5 mi north of Vogel Center, and 3.5 mi southeast of Falmouth.

DRAINAGE AREA.--243 mi^2.

PERIOD OF RECORD.--June 1966 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 1,130 ft from topographic map.

REMARKS.--Records good except those for the winter period, which are poor. Some regulation at low flow by dams above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--17 years, 124 ft^3/s, 6.93 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,150 ft^3/s Apr. 13, 1971, gage height, 6.33 ft; minimum, 29 ft^3/s Nov. 3, 1969, result of freezeup.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 364 ft^3/s Apr. 15, gage height, 4.17 ft, only peak above base of 350 ft^3/s; minimum, 57 ft^3/s Sept. 13, 14, 15; minimum gage height, 2.49 ft Oct. 4, 5, 6.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	63	88	131	178	125	142	164	150	224	89	73	64
2	61	97	141	175	120	150	187	165	207	90	72	63
3	61	100	225	169	120	159	204	178	193	91	68	63
4	60	97	247	164	120	162	227	152	188	84	68	61
5	59	96	298	167	120	174	252	130	193	80	67	61
6	60	97	299	169	118	196	250	118	192	77	66	64
7	60	97	301	166	115	226	235	134	186	75	66	68
8	60	102	254	160	115	243	222	238	177	73	65	66
9	60	102	209	156	112	253	212	271	165	71	62	62
10	65	103	186	165	110	240	263	206	155	71	64	61
11	67	119	175	175	105	206	309	156	146	69	108	62
12	71	147	160	152	103	178	267	132	140	67	146	60
13	69	179	147	150	114	163	226	120	131	65	123	60
14	66	172	150	150	122	156	264	122	110	64	90	58
15	64	147	145	145	117	152	340	166	103	63	79	58
16	64	126	142	145	116	146	337	177	99	62	74	66
17	66	117	140	143	123	142	262	151	95	63	71	79
18	66	113	139	142	121	144	223	135	108	64	69	94
19	65	110	140	142	121	195	203	148	90	71	67	122
20	93	116	142	140	137	253	199	216	86	69	65	152
21	136	124	145	140	152	219	196	240	83	76	67	178
22	115	124	147	140	163	155	182	230	81	85	93	164
23	100	117	147	140	160	202	172	217	80	80	118	145
24	91	114	190	137	166	147	166	223	78	74	98	132
25	86	108	250	138	156	186	162	225	77	69	80	112
26	84	110	270	135	139	172	158	220	75	67	74	99
27	79	106	246	135	137	169	154	211	83	66	70	91
28	78	102	225	128	132	164	152	198	113	68	69	85
29	82	117	222	128	---	161	152	207	108	69	67	78
30	85	125	186	128	---	158	152	234	91	69	66	74
31	84	---	180	125	---	156	---	238	---	69	64	---
TOTAL	2320	3472	6029	4629	3559	5619	6492	5708	3857	2250	2429	2602
MEAN	74.8	116	194	149	127	181	216	184	129	72.6	78.4	86.7
MAX	136	179	301	178	166	253	340	271	224	91	146	178
MIN	59	88	131	125	103	142	152	118	75	62	62	58
CFSM	.31	.48	.80	.61	.52	.75	.89	.76	.53	.30	.32	.36
IN.	.36	.53	.92	.71	.54	.86	.99	.87	.59	.34	.37	.40

CAL YR 1982 TOTAL 41360 MEAN 113 MAX 530 MIN 56 CFSM .47 IN 6.33
WTR YR 1983 TOTAL 48966 MEAN 134 MAX 340 MIN 58 CFSM .55 IN 7.50

04121500 MUSKEGON RIVER AT EVART, MI

LOCATION.--Lat 43°53'57", long 85°15'19", in NW1/4 NE1/4 sec.3, T.17 N., R.8 W., Osceola County, Hydrologic Unit 04060102, on right bank 500 ft downstream from bridge on U.S. Highway 10 in Evart, 0.4 mi upstream from Twin Creek, and at mile 123.9.

DRAINAGE AREA.--1,450 mi^2,approximately.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1930 to September 1931, October 1933 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1437: 1934, 1947(M).

GAGE.--Water-stage recorder. Datum of gage is 977.72 ft National Geodetic Vertical Datum of 1929. Prior to Nov. 7, 1956, nonrecording gages at sites 400 ft and 500 ft upstream at present datum.

REMARKS.--Water-discharge records good except those for the winter period, which are poor. Some regulation during low flow from dams above station.

AVERAGE DISCHARGE.--51 years, 998 ft^3/s, 9.35 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 7,790 ft^3/s Mar. 29, 1976; maximum gage height, 14.42 ft Apr. 9, 1959; minimum discharge observed, 164 ft^3/s Dec. 20, 1947, result of freezeup.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 3,670 ft^3/s Apr. 16, 17; maximum gage height, 10.48 ft Apr. 17; minimum discharge, 383 ft^3/s Sept. 15; minimum gage height, 6.70 ft Aug. 10, Sept. 15.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	552	816	1160	1710	943	1360	1770	1300	2320	950	438	462
2	534	861	1380	1640	944	1400	1930	1410	2190	875	434	452
3	528	879	2340	1510	962	1430	2130	1490	2110	833	461	447
4	522	885	2670	1390	942	1490	2370	1510	2070	815	445	437
5	516	881	3010	1420	940	1590	2450	1480	2130	779	433	427
6	510	885	3300	1380	920	1800	2490	1430	2030	733	422	588
7	510	880	3120	1370	900	2120	2440	1480	1900	697	417	532
8	505	891	3020	1340	880	2410	2360	2110	1800	673	413	479
9	500	904	2850	1220	880	2660	2300	2330	1750	656	414	463
10	516	940	2620	1280	880	2670	2580	2420	1690	628	416	445
11	528	1010	2450	1400	880	2630	2690	2290	1550	609	471	428
12	540	1160	2190	1420	880	2510	2760	2130	1440	592	529	417
13	570	1330	2000	1260	880	2360	2670	2070	1350	575	573	406
14	570	1390	1860	1150	870	2230	2970	2010	1270	533	592	398
15	576	1350	1820	1100	864	2110	3410	1950	1190	508	546	385
16	558	1270	1680	1050	895	1970	3550	1890	1120	484	511	428
17	564	1230	1530	860	988	1830	3600	1830	1060	467	487	454
18	582	1200	1340	700	1080	1730	3230	1710	1000	465	476	649
19	570	1170	1340	655	1100	1900	2810	1700	969	464	466	769
20	654	1200	1290	691	1240	2060	2510	1880	922	445	448	957
21	774	1270	1300	820	1580	2160	2300	1920	885	446	439	1260
22	854	1290	1220	896	1690	1980	2130	1900	851	459	476	1190
23	855	1280	1200	1010	1650	1840	1960	1910	826	477	497	1120
24	842	1260	1280	1100	1660	1850	1810	1920	798	471	525	1030
25	838	1210	1560	1120	1540	1790	1680	1980	769	452	535	953
26	842	1160	1730	1110	1410	1740	1570	2020	769	430	518	926
27	843	1110	1750	1090	1400	1710	1480	1980	784	407	505	884
28	837	1060	1800	1020	1350	1720	1420	1900	936	441	493	839
29	828	1070	1870	976	---	1720	1390	2050	929	452	477	791
30	818	1110	1800	962	---	1710	1350	2320	926	445	481	741
31	804	---	1710	954	---	1720	---	2380	---	438	475	---
TOTAL	20040	32952	60190	35604	31148	60200	70110	58700	40334	17699	14813	19757
MEAN	646	1098	1942	1149	1112	1942	2337	1894	1344	571	478	659
MAX	855	1390	3300	1710	1690	2670	3600	2420	2320	950	592	1260
MIN	500	816	1160	655	864	1360	1350	1300	769	407	413	385
CFSM	.45	.76	1.34	.79	.77	1.34	1.61	1.31	.93	.39	.33	.45
IN.	.51	.85	1.54	.91	.80	1.54	1.80	1.51	1.03	.45	.38	.51

CAL YR 1982 TOTAL 409820 MEAN 1123 MAX 4200 MIN 408 CFSM .77 IN 10.51
WTR YR 1983 TOTAL 461547 MEAN 1265 MAX 3600 MIN 385 CFSM .87 IN 11.84

04121500 MUSKEGON RIVER AT EVART, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: November 1956 to current year.

INSTRUMENTATION.--Temperature recorder since November 1956.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum, 28.0°C July 1, 1963, July 20, 1977; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum, 27.0°C July 20; minimum, 0.0°C on many days during winter period.

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	16.5	15.5	9.0	8.5	3.5	2.0	.0	.0	.0	.0	3.0	2.0
2	16.0	14.5	9.0	9.0	5.5	3.5	.0	.0	.0	.0	3.0	3.0
3	15.5	14.5	9.0	8.5	8.0	5.5	.0	.0	.0	.0	3.5	3.0
4	15.0	12.0	8.5	6.5	8.0	8.0	.0	.0	.0	.0	3.5	3.5
5	14.5	12.0	6.5	5.5	8.0	6.5	.0	.0	.0	.0	4.0	3.5
6	16.0	13.5	5.5	4.5	6.5	6.0	.0	.0	.0	.0	4.0	4.0
7	16.0	15.0	5.0	4.0	6.0	4.0	.0	.0	.0	.0	4.5	4.0
8	15.5	13.5	5.5	5.0	4.0	2.0	.0	.0	.0	.0	4.5	4.5
9	14.5	13.0	5.5	5.0	2.0	1.0	.0	.0	.0	.0	4.5	4.0
10	14.0	12.0	5.0	5.0	1.0	.0	.5	.0	.0	.0	4.0	3.0
11	13.5	11.0	5.5	5.0	.0	.0	.5	.5	.0	.0	3.0	2.0
12	11.5	10.5	6.5	5.5	.0	.0	.5	.5	.0	.0	3.0	2.0
13	11.0	10.5	6.0	5.0	.0	.0	.5	.5	.0	.0	3.5	3.0
14	10.5	10.0	5.0	4.0	.0	.0	.5	.0	.0	.0	4.0	3.5
15	10.0	9.5	4.0	3.0	.0	.0	.0	.0	.0	.0	4.5	4.0
16	9.5	8.0	3.0	2.0	.0	.0	.5	.0	.0	.0	4.5	4.0
17	8.5	7.0	2.0	2.0	.0	.0	.5	.5	.5	.0	4.5	4.0
18	9.0	7.0	2.0	2.0	.0	.0	.5	.5	.0	.0	4.5	4.5
19	10.0	9.0	4.0	2.0	.0	.0	.5	.5	.5	.0	4.5	4.0
20	10.0	8.5	5.5	4.0	.0	.0	.5	.5	1.0	.0	4.0	3.5
21	8.5	8.0	6.0	5.5	.0	.0	.5	.0	.5	.0	3.5	.5
22	8.0	7.0	5.5	5.0	.0	.0	.0	.0	.5	.0	1.0	.5
23	7.0	6.0	5.0	5.0	.5	.0	.0	.0	1.5	.5	.5	.0
24	6.5	5.5	5.0	4.0	1.0	.5	.0	.0	1.5	1.5	.5	.0
25	6.5	5.5	4.0	3.0	2.0	1.0	.0	.0	1.5	1.0	.5	.0
26	6.5	5.5	3.0	3.0	2.0	2.0	.0	.0	1.0	.5	.5	.0
27	6.5	6.0	3.0	2.0	2.0	1.5	.5	.0	1.5	1.0	.5	.5
28	8.0	6.5	2.0	1.5	1.5	1.5	.5	.0	3.0	1.5	1.5	.5
29	8.5	8.0	1.5	1.0	1.5	.5	.0	.0	---	---	2.0	1.0
30	9.0	8.0	2.0	1.5	.5	.0	.0	.0	---	---	3.0	1.5
31	9.0	8.5	---	---	.0	.0	.0	.0	---	---	3.5	2.0
MONTH	16.5	5.5	9.0	1.0	8.0	.0	.5	.0	3.0	.0	4.5	.0

04121500 MUSKEGON RIVER AT EVART, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	3.5	3.0	12.0	10.5	13.0	11.5	22.0	20.0	23.5	21.0	22.0	19.0
2	3.5	3.0	11.5	10.5	14.0	13.0	23.5	21.0	23.5	19.5	22.0	18.5
3	3.0	3.0	10.5	9.0	14.0	14.0	24.5	22.0	23.0	20.0	23.0	19.0
4	3.0	3.0	9.5	8.5	14.5	14.0	24.0	23.0	21.5	20.0	22.0	19.0
5	3.5	3.0	10.0	8.5	14.5	14.0	23.5	20.0	23.0	19.5	22.0	19.5
6	3.5	3.5	10.0	9.5	15.0	14.0	21.0	18.0	24.0	20.0	21.5	20.0
7	4.0	3.5	10.0	9.0	16.0	14.0	21.0	18.0	25.0	20.5	20.0	18.0
8	5.0	4.0	9.5	8.5	16.0	14.5	21.5	19.0	24.0	20.5	20.0	16.5
9	5.0	4.5	10.0	9.0	16.5	15.0	23.0	20.5	23.0	19.5	21.0	17.0
10	5.0	4.5	11.5	9.5	18.5	16.0	23.0	20.0	21.0	16.5	23.0	19.0
11	5.0	5.0	13.5	11.0	19.5	18.0	24.0	20.5	16.5	16.0	22.0	19.5
12	6.0	5.0	15.0	13.0	20.5	19.0	25.0	22.0	18.5	14.5	20.0	17.0
13	6.0	6.0	16.0	14.5	21.5	20.0	25.0	21.5	19.5	16.0	18.0	15.5
14	7.0	6.0	16.0	15.0	22.0	21.0	25.5	21.5	19.5	16.5	16.0	13.5
15	7.0	6.0	15.0	14.0	22.0	21.0	26.0	23.5	21.0	18.5	15.0	13.0
16	6.0	5.0	14.5	12.0	21.5	20.5	26.0	24.0	22.0	19.0	13.5	13.0
17	5.0	4.5	13.0	11.0	21.5	19.5	26.0	24.0	21.5	20.0	14.5	13.0
18	5.0	5.0	13.5	11.5	21.0	19.0	26.0	23.0	23.5	19.5	15.5	14.0
19	5.0	4.5	13.5	12.0	21.5	19.5	26.5	23.5	24.5	20.5	15.5	14.5
20	5.5	5.0	13.0	13.0	21.5	19.5	27.0	23.5	24.0	21.0	15.0	14.5
21	6.5	5.5	14.0	13.0	23.0	20.0	26.0	23.5	23.0	19.5	14.5	13.0
22	8.5	6.5	14.0	14.0	23.5	20.5	24.5	21.0	20.5	19.5	13.0	12.0
23	8.5	8.5	14.0	13.5	24.0	21.0	24.0	22.0	20.5	16.5	12.0	11.0
24	9.5	8.5	14.0	12.0	23.5	21.0	24.0	20.5	21.5	17.0	11.5	10.0
25	10.5	9.0	14.0	13.5	24.0	21.0	24.0	20.5	21.0	19.0	11.0	10.5
26	11.0	10.0	13.5	12.0	24.5	21.5	24.0	20.5	20.5	19.0	11.5	10.5
27	13.0	11.0	13.0	11.5	24.0	20.0	23.5	20.5	21.5	19.5	14.0	11.5
28	13.0	11.5	13.5	12.0	20.5	19.0	23.0	21.0	23.0	19.5	15.0	13.5
29	11.5	10.5	13.5	13.0	20.0	18.5	22.0	21.0	23.5	20.0	15.5	14.0
30	11.5	11.0	13.0	12.0	20.0	19.5	25.0	21.0	23.0	20.0	16.0	14.5
31	---	---	12.0	11.5	---	---	24.5	22.0	22.0	19.0	---	---
MONTH	13.0	3.0	16.0	8.5	24.5	11.5	27.0	18.0	25.0	14.5	23.0	10.0

04121900 LITTLE MUSKEGON RIVER NEAR MORLEY, MI

LOCATION.--Lat 43°30'09", long 85°20'33", in SW1/4 SW1/4 sec.24, T.13 N., R.9 W., Mecosta County, Hydrologic Unit 04060102, on right bank at upstream side of highway bridge on 130th Avenue, 0.5 mi downstream from Rustford Dam, and 5.2 mi east of Morley.

DRAINAGE AREA.--138 mi^2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1966 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 920 ft, from topographic map.

REMARKS.--Water-discharge records good except those for the winter period, which are poor. Some regulation by dams above station.

AVERAGE DISCHARGE.--17 years, 126 ft^3/s, 12.40 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,390 ft^3/s July 18, 1982, gage height, 6.98 ft; minimum, 22 ft^3/s July 21, 1979, gage height, 1.53 ft.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 400 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Dec. 3	0430	*632	*4.35	Apr. 14	1930	490	3.78

Minimum discharge, 34 ft^3/s June 22, gage height, 1.59 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	86	169	163	190	128	146	213	115	187	100	77	89
2	83	323	246	180	130	146	246	177	160	107	71	70
3	75	285	596	169	145	151	279	183	157	109	67	61
4	68	231	533	169	137	161	310	166	186	102	67	61
5	69	184	472	150	130	165	302	150	184	80	64	59
6	71	165	469	153	127	198	287	140	175	70	63	96
7	71	150	404	157	126	238	268	149	154	68	61	102
8	69	142	330	153	124	265	252	237	140	65	59	82
9	68	136	263	149	123	285	242	229	130	64	58	82
10	73	157	220	173	121	261	305	183	121	64	59	75
11	78	178	205	215	120	242	306	158	107	63	94	81
12	77	253	190	188	120	191	268	145	103	60	82	81
13	76	247	183	174	116	174	236	135	98	58	74	74
14	76	215	163	163	118	168	401	132	93	58	69	68
15	77	181	171	157	126	162	461	130	90	58	67	59
16	77	160	179	160	140	154	398	124	87	58	64	86
17	91	149	176	155	191	150	299	122	84	56	63	90
18	91	142	169	155	188	156	241	120	81	58	62	148
19	89	140	176	155	171	221	205	156	70	64	60	183
20	125	181	181	150	198	218	190	192	70	61	58	157
21	143	206	173	145	206	187	180	163	66	59	59	154
22	126	185	166	133	204	178	169	153	61	61	127	137
23	118	185	169	150	200	179	162	159	62	60	105	120
24	114	183	239	147	188	175	154	148	62	59	81	112
25	110	163	322	140	164	169	147	164	63	58	72	112
26	107	151	316	134	149	164	140	164	61	56	72	117
27	106	141	278	130	145	166	135	146	64	58	70	108
28	102	136	298	125	142	182	138	135	112	73	68	99
29	101	165	304	119	---	195	129	176	97	78	66	90
30	101	172	254	127	---	189	116	216	94	82	71	93
31	110	---	210	131	---	193	---	208	---	74	90	---
TOTAL	2828	5475	8218	4796	4177	5829	7179	4975	3219	2141	2220	2946
MEAN	91.2	183	265	155	149	188	239	160	107	69.1	71.6	98.2
MAX	143	323	596	215	206	285	461	237	187	109	127	183
MIN	68	136	163	119	116	146	116	115	61	56	58	59
CFSM	.66	1.33	1.92	1.12	1.08	1.36	1.73	1.16	.78	.50	.52	.71
IN.	.76	1.48	2.22	1.29	1.13	1.57	1.94	1.34	.87	.58	.60	.79

CAL YR 1982 TOTAL 54185 MEAN 148 MAX 1120 MIN 63 CFSM 1.07 IN 14.61
WTR YR 1983 TOTAL 54003 MEAN 148 MAX 596 MIN 56 CFSM 1.07 IN 14.56

04121900 LITTLE MUSKEGON RIVER NEAR MORLEY, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: November 1966 to current year.

INSTRUMENTATION.--Temperature recorder since November 1966.

REMARKS.--Temperature recorder clock stopped Oct. 1-26 (range in temperature 5.0 to 16.0), Oct. 28 to Nov. 30 (range in temperature 1.5 to 10.0°C), Dec. 31 to Mar. 28 (range in temperature 1.0 to 8.0°C), May 14 to Aug. 16 (range in temperature 9.0 to 26.5°C).

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum, 28.0°C Aug. 23, 1968, June 28, 1971; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum recorded, 25.5°C Aug. 19; minimum, 1.0°C on many days during winter period.

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	---	---			7.0	4.5					---	---
2	---	---			10.5	7.0					---	---
3	---	---			11.0	10.5					---	---
4	---	---			11.0	8.5					---	---
5	---	---			8.5	8.0					---	---
6	---	---			8.0	5.5					---	---
7	---	---			5.5	3.5					---	---
8	---	---			3.5	2.5					---	---
9	---	---			2.5	1.5					---	---
10	---	---			2.0	1.5					---	---
11	---	---			2.0	1.5					---	---
12	---	---			1.5	1.0					---	---
13	---	---			1.5	1.0					---	---
14	---	---			2.5	1.5					---	---
15	---	---			3.0	2.5					---	---
16	---	---			3.0	2.0					---	---
17	---	---			2.0	1.0					---	---
18	---	---			2.5	1.5					---	---
19	---	---			3.5	2.5					---	---
20	---	---			3.5	3.0					---	---
21	---	---			3.0	2.5					---	---
22	---	---			2.5	2.5					---	---
23	---	---			4.5	2.5					---	---
24	---	---			4.5	4.5					---	---
25	---	---			5.5	4.5					---	---
26	---	---			5.5	4.0					---	---
27	8.0	6.0			4.0	3.5					---	---
28	---	---			4.5	3.5					---	---
29	---	---			3.5	1.5					5.5	2.5
30	---	---			1.5	1.5					6.0	3.0
31	---	---			---	---					7.0	4.0

04121900 LITTLE MUSKEGON RIVER NEAR MORLEY, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	7.0	4.5	13.0	10.5					---	---	21.5	18.0
2	6.5	3.0	12.5	11.0					---	---	21.5	18.0
3	4.0	3.0	11.0	9.5					---	---	22.0	17.5
4	5.0	4.0	11.5	8.5					---	---	21.5	17.5
5	6.5	4.0	12.5	9.0					---	---	22.0	18.5
6	6.5	5.5	12.5	10.5					---	---	21.0	19.0
7	6.0	5.5	12.0	11.5					---	---	19.5	16.5
8	8.5	5.0	12.5	9.0					---	---	19.0	15.5
9	8.5	6.0	12.5	9.0					---	---	21.0	16.5
10	6.5	5.5	14.0	10.0					---	---	23.0	19.0
11	6.5	6.0	16.0	11.0					---	---	21.5	18.5
12	9.5	6.0	16.0	13.0					---	---	18.5	16.0
13	9.5	8.0	17.0	13.5					---	---	17.5	15.0
14	10.5	8.5	---	---					---	---	15.5	13.0
15	9.0	6.5	---	---					---	---	14.5	12.5
16	6.5	4.5	---	---					---	---	13.5	12.5
17	6.5	4.5	---	---					22.0	19.5	15.0	13.0
18	6.0	4.0	---	---					24.5	19.5	16.0	14.5
19	6.5	3.0	---	---					25.5	21.0	16.0	15.5
20	8.5	4.5	---	---					25.0	21.5	16.0	15.0
21	10.5	6.0	---	---					22.0	19.0	15.0	13.0
22	12.0	8.5	---	---					21.0	19.5	13.0	11.5
23	11.5	9.5	---	---					21.0	17.5	12.0	10.5
24	12.0	8.0	---	---					21.0	17.0	12.0	10.0
25	11.0	8.0	---	---					20.0	18.0	12.0	11.5
26	11.0	6.5	---	---					20.5	18.0	12.0	11.5
27	14.0	10.5	---	---					22.0	19.0	14.5	12.0
28	13.5	9.5	---	---					23.5	19.0	15.5	13.0
29	12.0	8.5	---	---					23.0	19.0	16.0	13.0
30	12.0	10.5	---	---					21.5	19.0	16.0	13.5
31	---	---	---	---					21.5	18.0	---	---
MONTH	14.0	3.0									23.0	10.0

04122000 MUSKEGON RIVER AT NEWAYGO, MI

LOCATION.--Lat 43°25'20", long 85°48'04", in NE1/4 NE1/4 sec.24, T.12 N., R.13 W., Newaygo County, Hydrologic Unit 04060102, on left bank near nonoperative powerplant at Newaygo, 600 ft downstream from Penoyer Creek and at mile 39.1.

DRAINAGE AREA.--2,350 mi^2, approximately.

PERIOD OF RECORD.--July to December 1908, July 1909 to July 1915, January 1916 to December 1919, October 1930 to current year. Monthly discharge only for some periods, published in WSP 1307. Records for June 1901 to December 1906, published in WSP 129, 170, and 206, have been found to be unreliable and should not be used.

REVISED RECORDS.--WSP 974: 1933, 1935, 1937-38. WSP 1307: 1940(M). See also PERIOD OF RECORD.

GAGE.--Water-stage recorder. Datum of gage is 625.83 ft National Geodetic Vertical Datum of 1929. October 1930 to January 1939, nonrecording gage, and Jan. 31, 1939, to Sept. 30, 1963, water-stage recorder at present site at datum 40.0 ft lower.

REMARKS.--Records good except those for periods of no gage-height record, Oct. 1 to Nov. 1, Dec. 16 to Feb. 26, which are fair. Flow regulated by powerplants above station, the largest of which are Croton Dam, Hardy Dam (since 1931), and Rogers Dam. Since Dec. 27, 1965, powerplant at Newaygo nonoperative, and in January 1969, dam at Newaygo was removed. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--61 years (water years 1910-14, 1917-19, 1931-83), 1,968 ft^3/s, 11.37 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 14,950 ft^3/s Mar. 25, 1913; minimum, 52 ft^3/s Oct. 2, 1965, gage height, 5.31 ft,result of regulation during pipeline repair; minimum daily, 330 ft^3/s Feb. 15, 1914.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 6,720 ft^3/s Dec. 4, gage height, 10.50 ft; maximum gage height, 10.51 ft Dec. 3; minimum discharge, 880 ft^3/s July 20, gage height, 6.58 ft, but may have been less during period of no gage-height record Oct. 1 to Nov. 1.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1480	1800	2840	2900	2550	2650	2840	2290	3500	1950	1650	1260
2	1200	2730	2620	2500	2500	2200	2870	2840	3600	2100	1450	1260
3	1000	2640	5640	2900	2600	1500	3660	3230	3500	2120	1080	1080
4	1030	1970	6680	2650	2300	1250	4220	2820	3450	1460	1230	1080
5	1040	1970	6650	2500	2500	2100	4110	2680	3000	1060	1230	1080
6	1420	1030	6620	3100	2100	1700	3720	2300	3200	1600	1350	1470
7	1250	1490	6610	3000	1850	2600	3720	2570	3660	1870	1070	1990
8	1430	1710	6290	1470	2500	3500	3710	3540	3300	1330	1060	1720
9	1030	2290	5120	3200	2500	3600	3710	4280	3400	1220	1060	1490
10	1020	2010	3470	3400	2200	3550	3710	4220	2470	1320	1090	1080
11	1030	2120	3000	3050	1950	3500	4290	3600	2310	1270	1260	1080
12	1100	2480	3420	3300	2000	3450	4870	3360	2310	1480	1520	1080
13	1350	2690	2360	3200	2100	3450	4130	3360	2300	1620	1230	1070
14	1520	2750	3770	3200	2100	3500	4430	3380	2300	1280	1350	1070
15	1070	2120	3470	2500	2200	3500	5920	3380	2300	1540	1320	1080
16	1330	2990	3600	2000	2300	3450	6180	2670	2290	1060	1230	1410
17	1070	2070	2500	1950	2450	3000	5900	2910	1720	1070	1230	1220
18	1080	2780	2100	2300	2600	2300	5250	2300	1600	1060	1180	1690
19	1300	1990	2000	1750	2300	2990	4520	2850	1620	1350	1080	2180
20	1500	2030	2250	1700	2800	3410	3490	3500	1810	1080	1070	2320
21	2000	2100	2500	2700	2100	3430	3650	3550	1660	1080	1210	2520
22	2300	2240	2750	1630	3000	3410	3710	3450	1890	1080	1470	3150
23	1400	2880	2700	2400	3400	3400	3560	3500	1640	1070	1730	2490
24	1450	2980	2600	2550	3350	3400	3020	3300	1580	1070	1290	2020
25	1600	2730	3400	2600	2550	3390	3100	3100	1380	1060	1080	1790
26	1900	2310	3700	2600	2700	2540	2580	3250	1480	1070	1080	1880
27	2000	1980	3700	2300	2500	2960	2510	3350	1440	1060	1260	1860
28	1650	1940	3700	2150	2220	2250	2360	3300	1980	1290	1260	1890
29	1600	1960	3650	2400	---	2320	2640	3400	1790	1500	1260	1870
30	1300	2510	3500	2700	---	2840	2430	3550	1800	1080	1260	1860
31	890	---	3200	2600	---	3290	---	3550	---	1470	1260	---
TOTAL	42340	67290	116410	79200	68220	90430	114810	99380	70280	41670	38900	49040
MEAN	1366	2243	3755	2555	2436	2917	3827	3206	2343	1344	1255	1635
MAX	2300	2990	6680	3400	3400	3600	6180	4280	3660	2120	1730	3150
MIN	890	1030	2000	1470	1850	1250	2360	2290	1380	1060	1060	1070
CFSM	.58	.95	1.60	1.09	1.04	1.24	1.63	1.36	1.00	.57	.53	.70
IN.	.67	1.07	1.84	1.25	1.08	1.43	1.82	1.57	1.11	.66	.62	.78

CAL YR 1982 TOTAL 831340 MEAN 2278 MAX 6680 MIN 890 CFSM .97 IN 13.16
WTR YR 1983 TOTAL 877970 MEAN 2405 MAX 6680 MIN 890 CFSM 1.02 IN 13.90

04122030 MUSKEGON RIVER NEAR BRIDGETON, MI
(National stream-quality accounting network station)

LOCATION.--Lat 43°19'05", long 86°02'11", in SW1/4 NW1/4 sec.30, T.11 N., R.14 W., Newago County, Hydrologic Unit 04060102, at bridge on Maple Island Road, 5 mi southwest of Bridgeton, 13 mi upstream from Muskegon Lake, and 20 mi downstream from gaging station at Newaygo.

DRAINAGE AREA.--2,420 mi^2, approximately.

PERIOD OF RECORD.--Water years 1974 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: November 1974 to September 1981.
WATER TEMPERATURES: November 1974 to September 1981.

INSTRUMENTATION.--Water-quality monitor November 1975 to September 1981.

REMARKS.--Quarterly samples are collected as a cross-section sample at or near vicinity of Maple Island Road bridge. Water-discharge measurements are made at times of sampling. Some regulation by dams above station.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE (water years 1975, 1978-81): Maximum, 1,550 micromhos Sept. 24, 1979; minimum, 69 micromhos May 3, 1979.
WATER TEMPERATURES (water years 1975, 1977-81): Maximum, 33.0°C July 19, 1977; minimum, 0.0°C on many days during winter periods.

WATER QUALITY DATA, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DATE	TIME	STREAM-FLOW, INSTANTANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (STAND-ARD UNITS)	TEMPER-ATURE (DEG C)	TUR-BID-ITY (NTU)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)
NOV 02...	1000	2780	371	7.6	13.0	8.1	9.1	89	K1800	K12000
MAR 16...	1130	3600	355	7.7	3.5	2.0	13.0	99	K18	180
MAY 18...	1100	2320	238	7.9	13.0	1.6	10.7	101	K14	180
SEP 14...	1400	1040	356	8.1	19.5	1.8	8.7	94	K930	99

DATE	HARD-NESS (MG/L AS CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	PERCENT SODIUM	SODIUM AD-SORP-TION RATIO	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	ALKA-LINITY LAB (MG/L AS CACO3)	CARBON DIOXIDE DIS-SOLVED (MG/L AS CO2)
NOV 02...	156	41	13	9.8	12	.4	1.6	140	7.2
MAR 16...	166	45	13	10	12	.4	1.2	140	5.4
MAY 18...	138	37	11	6.8	10	.3	1.1	120	2.9
SEP 14...	173	46	14	10	11	.3	.9	150	2.3

DATE	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER AC-FT)	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)
NOV 02...	23	18	.1	4.9	207	200	.28	1550	.25
MAR 16...	20	18	.1	7.6	218	199	.30	2120	.43
MAY 18...	18	14	<.1	3.5	201	164	.27	1260	.13
SEP 14...	20	18	.1	5.1	212	204	.29	595	<.10

04122030 MUSKEGON RIVER NEAR BRIDGETON, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DATE	NITROGEN, AMMONIA DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS, DISSOLVED (MG/L AS P)	PHOSPHORUS, ORTHO, DISSOLVED (MG/L AS P)	PHOSPHATE, ORTHO, DISSOLVED (MG/L AS PO4)	SEDIMENT, SUSPENDED (MG/L)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
NOV 02...	.030	.80	.040	.030	.050	.15	36	270	--
MAR 16...	.050	.50	.030	.010	<.010	--	40	389	43
MAY 18...	<.010	.60	.030	.010	<.010	--	25	157	42
SEP 14...	.030	.80	.700	.070	<.010	--	5	14	89

DATE	TIME	ALUMINUM, DISSOLVED (UG/L AS AL)	ARSENIC DISSOLVED (UG/L AS AS)	BARIUM, DISSOLVED (UG/L AS BA)	BERYLLIUM, DISSOLVED (UG/L AS BE)	CADMIUM DISSOLVED (UG/L AS CD)	CHROMIUM, DISSOLVED (UG/L AS CR)	COBALT, DISSOLVED (UG/L AS CO)	COPPER, DISSOLVED (UG/L AS CU)	IRON, DISSOLVED (UG/L AS FE)	LEAD, DISSOLVED (UG/L AS PB)
NOV 02...	1000	10	2	28	<1	<1	<1	<3	1	32	1
MAR 16...	1130	10	1	26	<1	<1	4	<3	4	45	3
MAY 18...	1100	<10	1	21	<1	<1	1	<3	3	22	2
SEP 14...	1400	10	2	38	<1	<1	<1	<3	<1	6	1

DATE	LITHIUM DISSOLVED (UG/L AS LI)	MANGANESE, DISSOLVED (UG/L AS MN)	MERCURY DISSOLVED (UG/L AS HG)	MOLYBDENUM, DISSOLVED (UG/L AS MO)	NICKEL, DISSOLVED (UG/L AS NI)	SELENIUM, DISSOLVED (UG/L AS SE)	SILVER, DISSOLVED (UG/L AS AG)	STRONTIUM, DISSOLVED (UG/L AS SR)	VANADIUM, DISSOLVED (UG/L AS V)	ZINC, DISSOLVED (UG/L AS ZN)
NOV 02...	<4	6	<.1	<10	<1	<1	2	160	<6.0	<4
MAR 16...	<4	4	.1	<10	1	<1	<1	140	<6.0	15
MAY 18...	<4	2	<.1	<10	2	<1	<1	110	<6.0	<3
SEP 14...	11	2	<.1	<10	<1	<1	<1	160	<6.0	6

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04122100 BEAR CREEK NEAR MUSKEGON, MI

LOCATION.--Lat 43°17'19", long 86°13'22", in SW1/4 NW1/4 sec.4, T.10 N., R.16 W., Muskegon County, Hydrologic Unit 04060102, on left bank at upstream side of bridge on North Getty Street, 1.5 mi upstream from Little Bear Creek, and 3.9 mi northeast of Muskegon.

DRAINAGE AREA.--14.8 mi^2.

PERIOD OF RECORD.--October 1965 to current year.

REVISED RECORDS.--WDR MI-80-1: 1976(M), 1978(M), 1979(P).

GAGE.--Water-stage recorder. Datum of gage is 590.00 ft Michigan Department of Natural Resources datum. Prior to Mar. 17, 1978, at different datum.

REMARKS.--Records good except those for period of no gage-height record, Aug. 20 to Sept. 21, which are poor. Some regulation during low flow by dams and irrigatin above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--18 years, 16.5 ft^3/s, 15.14 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 930 ft^3/s Mar. 5, 1976, gage height, 11.00 ft, datum then in use; minimum, 1.0 ft^3/s Aug. 5, 17, 22, 1971.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 100 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Dec. 3	1100	*203	*14.98	Apr. 14	2000	104	13.71
Dec. 6	0500	121	14.20				

Minimum discharge, 3.0 ft^3/s July 12, gage height, 10.18 ft, but may have been less during period of no gage-height record Aug. 20 to Sept. 21.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	5.8	27	22	23	21	15	27	16	26	9.5	5.1	6.0
2	5.8	56	46	22	24	15	34	26	21	8.3	4.5	5.0
3	5.8	34	174	20	36	14	57	27	23	7.5	4.5	4.3
4	5.5	23	91	19	27	14	39	23	30	7.8	5.0	4.2
5	5.5	20	72	19	24	14	30	20	22	6.7	4.5	5.0
6	5.8	20	103	20	23	15	26	18	18	6.1	4.3	8.2
7	6.6	18	60	23	21	19	25	22	15	5.8	4.1	6.8
8	6.6	17	42	22	20	29	24	35	16	5.7	3.7	6.0
9	6.7	16	36	20	20	38	27	25	15	5.9	3.5	5.9
10	7.3	26	32	24	20	31	44	21	16	5.2	4.2	5.5
11	7.0	28	29	33	21	22	33	18	15	4.9	8.6	5.9
12	7.0	46	27	29	19	20	27	16	14	4.5	5.6	5.7
13	6.6	43	24	25	18	19	28	15	13	4.4	4.9	5.4
14	6.7	27	25	21	18	19	72	16	13	4.3	4.6	5.1
15	6.7	23	26	21	20	19	66	19	12	4.4	4.2	4.9
16	6.7	20	26	21	23	19	40	18	12	4.2	3.8	6.4
17	6.7	18	24	18	28	19	32	17	8.5	5.3	5.2	8.0
18	6.8	17	23	18	23	24	28	16	7.8	5.1	5.1	11
19	7.0	16	25	18	23	28	26	23	7.4	4.7	4.5	16
20	23	26	24	18	25	32	24	28	7.2	5.3	4.3	12
21	18	28	22	18	23	34	22	24	6.7	5.1	5.6	10
22	13	21	21	22	22	25	21	23	6.5	6.5	11	8.2
23	11	25	22	19	22	21	21	23	6.3	5.2	7.6	11
24	10	27	27	20	19	21	20	20	6.0	4.6	5.8	7.9
25	9.9	21	41	21	17	21	19	21	5.9	4.1	5.2	9.2
26	9.2	18	36	21	16	21	18	20	5.6	3.8	5.2	10
27	8.7	17	28	21	15	21	17	18	6.8	3.8	5.1	8.4
28	8.6	18	34	20	15	36	17	17	15	10	5.0	7.3
29	8.7	29	34	18	---	37	18	24	11	6.9	4.9	6.5
30	8.9	27	25	23	---	33	17	25	10	5.6	5.5	6.1
31	8.6	---	23	23	---	30	---	30	---	5.3	7.3	---
TOTAL	260.2	752	1244	660	603	725	899	664	391.7	176.5	162.4	221.9
MEAN	8.39	25.1	40.1	21.3	21.5	23.4	30.0	21.4	13.1	5.69	5.24	7.40
MAX	23	56	174	33	36	38	72	35	30	10	11	16
MIN	5.5	16	21	18	15	14	17	15	5.6	3.8	3.5	4.2
CFSM	.57	1.70	2.71	1.44	1.45	1.58	2.03	1.45	.89	.38	.35	.50
IN.	.65	1.89	3.13	1.66	1.52	1.82	2.26	1.67	.98	.44	.41	.56

CAL YR 1982 TOTAL 8279.8 MEAN 22.7 MAX 175 MIN 5.5 CFSM 1.53 IN 20.81
WTR YR 1983 TOTAL 6759.7 MEAN 18.5 MAX 174 MIN 3.5 CFSM 1.25 IN 16.99

04122200 WHITE RIVER NEAR WHITEHALL, MI

LOCATION.--Lat 43°27'51", long 86°13'57", in SE1/4 NW1/4 sec.4, T.12 N., R.16 W., Muskegon County, Hydrologic Unit 04060101, on right bank 30 ft downstream from bridge on Fruitvale Road, 6.3 mi downstream from North Branch, and 6.9 mi northeast of Whitehall.

DRAINAGE AREA.--406 mi², revised.

PERIOD OF RECORD.--August 1957 to current year.

GAGE.--Water-stage recorder. Datum of gage is 594.1 ft National Geodetic Vertical Datum of 1929. Nov. 18, 1957, to Oct. 22, 1958, nonrecording gage at same site and datum.

REMARKS.--Records good. Some regulation during low flow by dams above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--26 years, 433 ft³/s, 14.48 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 5,400 ft³/s Sept. 1, 1975, gage height, 7.46 ft; minimum, 163 ft³/s Aug. 18, 19, 1958.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,730 ft³/s Dec. 4, gage height, 5.63 ft; minimum, 246 ft³/s July 28, gage height, 1.53 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	370	456	602	660	506	523	645	498	626	389	458	339
2	368	512	637	628	498	518	660	509	605	375	469	324
3	364	579	837	596	525	516	676	537	579	359	442	305
4	362	613	1670	576	570	519	755	563	552	349	397	291
5	362	598	1430	562	538	524	763	563	535	340	369	285
6	362	572	1370	552	509	530	710	549	526	328	349	380
7	366	545	1490	549	496	549	673	537	516	321	334	505
8	370	522	1250	550	488	577	645	555	498	312	317	519
9	372	513	1080	546	479	599	627	610	474	308	303	440
10	380	510	969	547	472	606	614	646	456	305	298	385
11	378	532	876	565	464	611	657	624	439	300	353	366
12	378	580	825	603	444	606	663	601	425	292	398	372
13	380	629	780	609	496	590	638	564	411	283	375	360
14	390	734	675	589	477	560	655	526	406	276	344	349
15	392	715	646	566	469	535	862	507	394	272	320	335
16	386	655	623	531	488	517	1030	497	385	265	309	351
17	384	620	610	533	540	504	884	486	374	278	307	382
18	388	582	603	504	613	508	804	474	362	291	308	414
19	398	547	596	489	636	557	756	486	352	282	300	466
20	484	551	592	483	611	653	692	525	350	285	289	517
21	558	578	594	537	620	752	639	575	344	285	283	542
22	640	622	591	570	625	700	607	576	339	297	351	588
23	638	623	586	574	628	653	577	577	330	304	418	577
24	582	605	591	561	631	621	551	571	328	282	413	550
25	530	610	628	552	620	594	532	556	319	271	378	523
26	484	595	708	524	592	580	511	554	315	260	346	492
27	464	568	767	470	557	576	501	545	321	252	332	495
28	448	548	753	512	533	578	501	522	381	354	323	480
29	440	546	751	567	---	597	502	535	431	477	311	452
30	430	574	767	530	---	628	502	582	406	577	311	420
31	427	---	711	503	---	643	---	640	---	562	337	---
TOTAL	13275	17434	25608	17138	15125	18024	19832	17090	12779	10131	10842	12804
MEAN	428	581	826	553	540	581	661	551	426	327	350	427
MAX	640	734	1670	660	636	752	1030	646	626	577	469	588
MIN	362	456	586	470	444	504	501	474	315	252	283	285
CFSM	1.05	1.43	2.03	1.36	1.33	1.43	1.63	1.36	1.05	.81	.86	1.05
IN.	1.22	1.60	2.35	1.57	1.39	1.65	1.82	1.57	1.17	.93	.99	1.17

CAL YR 1982 TOTAL 205535 MEAN 563 MAX 2180 MIN 340 CFSM 1.39 IN 18.83
WTR YR 1983 TOTAL 190082 MEAN 521 MAX 1670 MIN 252 CFSM 1.28 IN 17.42

04122500 PERE MARQUETTE RIVER AT SCOTTVILLE, MI

LOCATION.--Lat 43°56'42", long 86°16'43", in NW1/4 NW1/4 sec.19, T18 N., R.16 W., Mason County, Hydrologic Unit 04060101, on right bank 20 ft upstream from highway bridge at south edge of Scottville, 1.4 mi upstream from India Creek and 5.6 mi downstream from Big South Branch.

DRAINAGE AREA.--681 mi^2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--August 1939 to current year. Prior to October 1942, published as "at Custer".

REVISED RECORDS.--WSP 1437: 1941(M), 1943(M), 1949(M), 1950. WDR MI-81: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 597.66 ft National Geodetic Vertical Datum of 1929. Prior to June 12, 1943, nonrecording gage at bridge 4.5 mi upstream at different datum.

REMARKS.--Water-discharge records good. Some regulation at low flow.

AVERAGE DISCHARGE.--44 years, 667 ft^3/s, 13.30 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,970 ft^3/s July 1, 1969, gage height, 6.26 ft; minimum, 209 ft^3/s Dec. 11, 1962, discharge measurement; minimum daily, 310 ft^3/s Aug. 9, 10, 1941.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,420 ft^3/s Dec. 6, gage height, 5.30 ft minimum, 404 ft^3/s July 28, gage height, 1.75 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	536	655	895	1070	739	825	993	768	1070	566	587	521
2	526	678	949	994	740	809	1000	789	1020	560	547	499
3	517	711	1150	943	746	798	1040	819	941	540	540	466
4	509	749	1490	895	760	796	1080	851	881	556	526	446
5	502	757	2020	856	746	806	1110	858	858	553	513	439
6	500	737	2400	842	739	832	1110	844	862	561	500	462
7	504	720	2300	847	725	868	1070	827	862	533	485	466
8	504	709	2110	834	715	917	1010	904	825	502	469	535
9	512	696	1950	818	706	973	971	1010	776	486	450	535
10	511	725	1710	812	695	1020	978	1120	738	481	444	503
11	507	754	1500	831	679	1030	998	1150	716	477	471	486
12	515	831	1460	878	646	996	1020	1020	687	464	497	477
13	515	922	1270	911	660	938	1040	907	661	454	501	479
14	523	1030	1140	892	683	886	1050	850	638	451	477	467
15	542	1110	1080	857	699	846	1110	818	618	432	457	453
16	551	1100	1030	820	720	819	1230	792	607	425	453	480
17	564	1010	983	758	788	791	1330	779	595	424	442	497
18	560	930	957	780	859	777	1310	752	582	432	434	652
19	573	881	928	762	903	834	1190	772	564	452	426	709
20	690	871	908	772	916	936	1100	835	557	477	416	820
21	776	874	903	825	929	1070	1020	886	547	459	425	970
22	862	902	896	909	970	1140	959	937	536	447	493	1070
23	941	943	912	881	1010	1070	909	914	525	440	520	1110
24	960	949	1010	840	1030	970	871	890	518	432	558	1100
25	876	922	1170	790	1020	926	845	908	514	424	531	1020
26	795	904	1210	760	975	923	819	896	504	416	529	948
27	746	867	1260	722	910	941	797	900	525	409	492	895
28	712	837	1280	778	851	934	782	880	576	490	480	863
29	689	845	1210	732	---	922	770	875	579	537	462	822
30	671	867	1170	725	---	941	770	910	585	585	463	774
31	655	---	1140	729	---	971	---	1000	---	618	498	---
TOTAL	19344	25486	40391	25863	22559	28305	30282	27461	20467	15083	15086	19964
MEAN	624	850	1303	834	806	913	1009	886	682	487	487	665
MAX	960	1110	2400	1070	1030	1140	1330	1150	1070	618	587	1110
MIN	500	655	895	722	646	777	770	752	504	409	416	439
CFSM	.92	1.25	1.91	1.23	1.18	1.34	1.48	1.30	1.00	.72	.72	.98
IN.	1.06	1.39	2.21	1.41	1.23	1.55	1.65	1.50	1.12	.82	.82	1.09

CAL YR 1982 TOTAL 305527 MEAN 837 MAX 2840 MIN 487 CFSM 1.23 IN 16.69
WTR YR 1983 TOTAL 290291 MEAN 795 MAX 2400 MIN 409 CFSM 1.17 IN 15.86

04122500 PERE MARQUETTE RIVER AT SCOTTVILLE, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: May 1968 to current year.

INSTRUMENTATION.--Temperature recorder since May 1968.

REMARKS.--Temperature recorder clock stopped Dec. 21 to Jan. 13 (range in temperature 1.0 to 6.5°C). No record Jan. 24 to Feb. 8, May 3 to June 7.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum, 25.0°C July 20, 21, 1977; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum recorded, 24.5°C July 15, 16; minimum recorded, 0.5°C on many days during winter period.

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	15.0	15.0	10.5	9.5	5.5	4.5	---	---	---	---	5.0	4.0
2	15.0	14.5	10.5	10.5	8.5	5.5	---	---	---	---	6.0	4.5
3	14.5	14.5	10.5	10.0	9.5	8.5	---	---	---	---	7.5	5.5
4	14.5	13.0	10.0	8.0	9.5	9.0	---	---	---	---	7.5	7.0
5	13.5	13.0	8.0	6.5	9.0	8.5	---	---	---	---	8.5	7.5
6	15.0	13.5	6.5	5.5	8.5	7.0	---	---	---	---	9.0	8.5
7	15.0	15.0	6.0	5.0	7.0	5.0	---	---	---	---	9.5	9.0
8	15.0	14.0	6.5	6.0	5.0	3.5	---	---	---	---	9.5	9.0
9	14.0	13.0	6.5	6.5	3.5	2.0	---	---	2.0	1.5	9.0	7.0
10	13.5	13.0	6.5	6.5	2.0	1.5	---	---	2.0	1.5	7.0	5.5
11	13.5	12.5	7.0	6.5	1.5	1.5	---	---	1.5	1.5	5.5	4.5
12	12.5	12.0	8.0	7.0	1.5	1.5	---	---	2.0	1.5	5.5	4.0
13	12.0	11.0	8.0	6.0	1.5	1.5	---	---	2.0	1.5	6.0	4.0
14	11.0	11.0	6.0	4.5	1.5	1.5	1.0	1.0	1.5	1.5	6.0	5.5
15	11.0	10.5	4.5	3.5	2.0	1.5	1.0	.5	2.0	1.5	6.0	5.5
16	10.5	9.5	3.5	3.0	2.5	2.0	.5	.5	2.0	2.0	6.0	5.5
17	9.5	6.5	3.0	3.0	2.5	2.0	.5	.5	2.5	2.0	7.5	6.0
18	9.5	6.5	4.0	3.0	2.0	2.0	.5	.5	3.0	2.5	7.5	7.5
19	10.5	9.5	6.0	4.0	2.5	2.0	.5	.5	3.0	3.0	7.5	6.5
20	10.5	10.0	8.0	6.0	2.5	2.5	.5	.5	3.5	3.0	6.5	5.0
21	10.0	9.5	8.0	8.0	---	---	.5	.5	4.0	3.5	5.0	2.0
22	9.5	6.0	8.0	6.5	---	---	.5	.5	4.5	4.0	2.5	1.5
23	8.0	7.0	6.5	6.5	---	---	.5	.5	5.0	4.5	2.5	1.5
24	7.0	6.5	6.5	4.5	---	---	---	---	5.0	4.0	3.5	2.0
25	7.0	6.5	4.5	4.0	---	---	---	---	4.0	2.5	3.5	1.5
26	7.5	6.5	4.0	4.0	---	---	---	---	3.0	2.0	3.5	2.5
27	7.5	6.5	4.0	3.0	---	---	---	---	4.0	2.5	3.5	2.5
28	9.0	7.5	3.0	2.5	---	---	---	---	5.0	4.0	5.0	3.0
29	9.5	9.0	3.0	2.5	---	---	---	---	---	---	5.5	3.5
30	9.5	9.5	4.5	3.0	---	---	---	---	---	---	6.0	4.5
31	9.5	9.5	---	---	---	---	---	---	---	---	7.0	5.0
MONTH	15.0	6.5	10.5	2.5							9.5	1.5

04122500 PERE MARQUETTE RIVER AT SCOTTVILLE, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	8.5	6.5	9.5	9.5	---	---	21.5	20.5	22.0	21.0	20.0	18.5
2	8.5	7.0	9.5	9.5	---	---	22.5	20.5	21.0	19.5	19.5	18.0
3	7.0	6.5	---	---	---	---	24.0	22.5	21.0	19.5	20.0	19.0
4	6.5	6.0	---	---	---	---	24.0	23.0	19.5	19.0	20.5	19.5
5	7.0	6.0	---	---	---	---	23.5	21.0	20.0	19.0	20.5	20.0
6	7.0	7.0	---	---	---	---	21.0	18.0	20.5	19.0	20.0	19.5
7	7.5	7.0	---	---	---	---	20.0	18.0	21.0	20.0	19.5	18.0
8	9.5	7.0	---	---	17.0	14.5	21.0	19.0	21.5	20.5	18.5	17.0
9	9.5	8.0	---	---	18.0	16.0	21.5	20.5	21.5	19.5	19.5	18.0
10	8.0	8.0	---	---	19.5	16.5	21.5	20.5	20.0	17.0	21.0	19.5
11	8.5	6.0	---	---	20.5	18.0	23.5	21.0	17.0	17.0	21.0	19.5
12	9.5	8.0	---	---	22.0	19.5	23.5	22.5	18.0	16.0	19.5	17.5
13	10.0	9.5	---	---	22.5	20.0	23.5	22.0	18.5	16.5	17.5	16.0
14	10.0	10.0	---	---	22.5	20.5	24.0	22.5	18.5	18.0	16.5	14.5
15	10.0	9.0	---	---	22.5	21.0	24.5	23.5	20.5	18.5	15.0	13.0
16	9.0	8.0	---	---	22.0	20.0	24.5	23.0	20.5	19.5	13.0	13.0
17	8.5	7.5	---	---	21.5	19.0	24.0	22.0	20.5	20.5	14.0	13.0
18	8.0	7.0	---	---	20.5	18.0	23.0	22.0	21.5	20.0	15.5	14.0
19	7.5	6.5	---	---	20.5	18.5	23.0	21.5	23.0	21.0	15.5	15.0
20	8.5	7.0	---	---	21.0	19.0	23.0	22.0	23.0	21.5	15.5	15.0
21	8.5	8.0	---	---	22.0	20.0	23.5	21.5	22.0	19.5	15.0	14.0
22	8.5	8.5	---	---	22.5	20.5	22.5	21.0	19.5	19.5	14.0	12.5
23	8.5	8.5	---	---	22.5	21.0	22.5	21.5	19.5	18.0	12.5	11.5
24	9.0	8.5	---	---	22.5	20.5	22.5	20.5	19.5	17.5	11.5	10.5
25	9.0	9.0	---	---	22.0	20.0	21.0	20.0	19.5	18.5	11.0	11.0
26	9.0	9.0	---	---	23.5	21.5	21.0	19.5	18.5	18.0	12.0	11.0
27	9.0	9.0	---	---	23.5	21.0	20.5	19.0	19.0	18.0	13.5	12.0
28	9.0	9.0	---	---	21.0	19.5	20.5	20.0	20.0	18.5	14.5	13.5
29	9.0	9.0	---	---	20.5	18.5	20.0	20.0	21.0	19.0	15.0	14.0
30	9.5	9.0	---	---	21.0	19.5	21.0	19.5	21.0	19.5	15.0	14.5
31	---	---	---	---	---	---	22.0	20.0	20.0	18.5	---	---
MONTH	10.0	6.0					24.5	18.0	23.0	16.0	21.0	10.5

04124000 MANISTEE RIVER NEAR SHERMAN, MI

LOCATION.--Lat 44°26'11", long 85°41'55", in NE1/4 NE1/4 sec.36, T.24 N., R.12 W., Wexford County, Hydrologic Unit 04060103, on downstream side of bridge near right pier on State Highway 37, 250 ft upstream from Wheeler Creek, 0.9 mi north of Sherman, and at mile 60.8.

DRAINAGE AREA.--900 mi^2.

PERIOD OF RECORD.--July 1903 to May 1916, October 1930 to September 1931, October 1933 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1004: 1936(M). WSP 1307: 1911, 1913-14(M), 1934(M), 1936(M), 1937, 1939-40(M). WSP 1437: 1911, 1913(M), 1937.

GAGE.--Nonrecording gage. Altitude of gage is 804 ft, from river profile map. Prior to Apr. 13, 1934, at various datums.

REMARKS.--Records fair except those for the period of no gage-height record, Oct. 10 to June 5, which are poor. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--63 years (water years 1904-15, 1931, 1934-83), 1,055 ft^3/s, 15.92 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,570 ft^3/s Mar. 25, 1913, gage height, 7.1 ft, from graph based on gage readings, datum then in use; minimum daily, 540 ft^3/s Feb. 21-23, 1936.

EXTREMES FOR CURRENT YEAR.--Maximum daily discharge, 2,800 ft^3/s May 8; minimum daily, 730 ft^3/s Oct. 7.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	810	950	1120	1320	1060	1100	1280	1100	1420	1000	808	886
2	800	1000	2200	1170	1080	1130	1300	1700	1370	1000	787	869
3	800	1050	2000	1000	1080	1200	1350	1830	1320	1030	775	848
4	800	1100	1700	900	1050	1250	1600	1250	1300	1080	775	852
5	781	1140	1540	1030	1020	1300	1720	980	1280	984	763	790
6	760	1120	1400	1120	1000	1450	1650	1300	1250	942	760	852
7	730	1000	1640	1160	940	1900	1500	2100	1210	897	766	858
8	763	920	1830	1180	940	2140	1520	2800	1170	862	757	841
9	799	870	1500	1180	940	1400	1550	2200	1160	876	745	830
10	820	1020	1250	1180	960	1060	1660	2100	1140	862	972	848
11	830	1400	1150	1190	960	1240	1600	2300	1110	844	1070	862
12	830	1950	1150	1160	960	1400	1550	2100	1100	844	1070	852
13	820	1900	1140	1150	960	1510	1570	1300	1080	830	1040	844
14	830	1600	1110	1140	960	1300	1600	1150	1040	824	1020	817
15	850	1430	1120	1120	960	1200	1600	1250	1020	824	1000	817
16	880	1350	1110	1080	940	1190	1590	1400	988	811	950	852
17	890	1250	1080	1050	950	1180	1530	1520	968	805	900	814
18	890	1280	1080	970	1010	1350	1380	1550	964	817	890	808
19	1000	1300	1080	900	1090	1800	1300	1650	950	805	890	855
20	1200	1320	1080	870	1230	1600	1280	1900	942	802	886	942
21	1530	1240	1060	1000	1370	1420	1240	1700	918	827	925	992
22	1300	1240	1060	1020	1370	1350	1220	1650	914	911	964	1030
23	1130	1280	1300	1030	1320	1380	1210	2000	904	855	925	980
24	1090	1260	1600	1030	1220	1360	1210	1800	897	827	922	928
25	1010	1200	1700	1000	1180	1350	1210	1680	890	799	883	894
26	930	1130	1530	940	1160	1350	1200	1600	883	802	855	858
27	870	1100	1480	880	1140	1300	1080	1550	939	787	841	824
28	930	1120	1400	900	1120	1200	1030	1520	992	844	830	811
29	950	1120	1350	920	---	1170	1020	1500	968	862	820	787
30	950	1100	1310	940	---	1170	1050	1480	953	852	900	775
31	940	---	1310	1050	---	1220	---	1450	---	838	925	---
TOTAL	28513	36740	42380	32580	29970	41970	41600	51410	32040	26943	27414	25816
MEAN	920	1225	1367	1051	1070	1354	1387	1658	1068	869	884	861
MAX	1530	1950	2200	1320	1370	2140	1720	2800	1420	1080	1070	1030
MIN	730	870	1060	870	940	1060	1020	980	883	787	745	775
CFSM	1.02	1.36	1.52	1.17	1.19	1.50	1.54	1.84	1.19	.97	.98	.96
IN.	1.18	1.52	1.75	1.35	1.24	1.73	1.72	2.12	1.32	1.11	1.13	1.07

CAL YR 1982 TOTAL 369247 MEAN 1012 MAX 2730 MIN 700 CFSM 1.12 IN 15.26
WTR YR 1983 TOTAL 417376 MEAN 1143 MAX 2800 MIN 730 CFSM 1.27 IN 17.25

04126000 MANISTEE RIVER NEAR MANISTEE, MI

LOCATION.--Lat 44°16'14", long 86°11'56", in NW1/4 NW1/4 sec.36, T.22 N., R.16 W., Manistee County, Hydrologic Unit 04060103, on right bank 6.4 mi northeast of Manistee, 7.8 mi upstream from Manistee Lake, and at mile 10.8.

DRAINAGE AREA.--1,780 mi^2, approximately.

PERIOD OF RECORD.--October 1951 to current year. Monthly discharge only for October, November, 1951, published in WSP 1727.

GAGE.--Water-stage recorder. Altitude of gage is 585 ft, from river-profile map.

REMARKS.--Records good. Flow regulated at all stages by Tippy hydroelectric powerplant 21 mi above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--32 years, 2,001 ft^3/s, 15.27 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 7,120 ft^3/s Mar. 30, 1976, gage height, 8.37 ft; maximum gage height, 9.15 ft Feb. 12, 1955, backwater from ice; minimum daily discharge, 570 ft^3/s June 18, 1980.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 4,410 ft^3/s Dec. 9, gage height, 7.83 ft; minimum, 597 ft^3/s July 9, gage height, 3.29 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1430	1440	2240	2480	2020	2280	2240	1710	3150	1770	1510	1690
2	1570	1970	2540	2210	1990	2190	2200	1710	2960	1850	1500	1550
3	1340	2100	3180	2330	1920	1960	2160	2310	2900	1810	1820	1530
4	1210	2260	3550	2120	1910	2270	2390	2690	2880	1490	1500	1190
5	1520	1930	3790	2210	1950	2440	2550	2660	2220	1940	1910	1160
6	1590	2150	4030	2160	1620	2300	2810	2530	2570	2020	1690	1650
7	1750	1590	4180	2180	1660	2380	2840	2550	2580	1760	1330	1870
8	1450	1580	4120	2200	1910	2720	2670	2980	2120	1590	1200	1920
9	1680	2030	4300	1860	1810	2820	2570	3320	2230	1360	1480	1540
10	1290	1780	3730	1690	1790	2910	2540	3650	2250	1330	1620	1620
11	1190	2120	3180	2310	1750	3220	2680	3670	2150	1630	1790	1320
12	1650	2620	2220	2480	1600	3010	2850	3490	1620	1530	2240	1170
13	1610	3160	1750	2210	1480	2490	2970	3330	1960	1490	1840	1820
14	1780	3490	2260	2220	1770	2450	3190	2720	1820	1990	1610	1550
15	1460	3380	2030	2220	1990	2080	3330	2200	1930	1300	1940	1470
16	1590	3240	2380	2080	1890	1960	3190	2030	1920	1410	2040	1640
17	1410	3160	2350	1510	2030	1700	3160	2470	1890	1250	1820	1880
18	1400	2850	2070	1630	2150	1970	2160	2310	2030	1310	1770	1640
19	1920	2170	1890	1810	2140	2100	2680	2600	1560	1820	1730	1820
20	2080	2100	1690	1790	1770	2520	2760	2470	1380	1690	1640	2120
21	2550	1950	2240	1890	1980	2530	2480	2860	1770	1660	1300	2690
22	2730	2040	2170	1700	2330	2920	2400	3260	1960	1440	1520	2830
23	2270	2650	2230	1580	2450	2860	1870	3430	1800	1810	2410	3170
24	1850	2590	2360	1990	2510	2560	1770	3310	1690	1470	1590	3040
25	2060	2120	2470	2070	2670	2180	1740	3350	1510	1320	1780	2900
26	2110	2070	3060	2060	2610	2160	2200	3390	1470	1460	1810	2680
27	1880	1900	2870	2010	1670	1810	1910	3090	1480	1630	1590	2420
28	1640	1770	3020	2000	1670	2000	2010	2950	1770	1720	1350	2190
29	1640	2140	3280	1770	---	2460	2110	2830	2060	2130	1350	1940
30	1760	2320	3400	1760	---	2090	1820	3100	2220	1630	1770	2070
31	1310	---	3120	1920	---	2210	---	3140	---	1370	1770	---
TOTAL	52720	68670	87700	62450	55040	73550	74250	88110	61850	49980	52220	58080
MEAN	1701	2289	2829	2015	1966	2373	2475	2842	2062	1612	1685	1936
MAX	2730	3490	4300	2480	2670	3220	3330	3670	3150	2130	2410	3170
MIN	1190	1440	1690	1510	1480	1700	1740	1710	1380	1250	1200	1160
CFSM	.96	1.29	1.59	1.13	1.10	1.33	1.39	1.60	1.16	.91	.95	1.09
IN.	1.10	1.44	1.83	1.31	1.15	1.54	1.55	1.84	1.29	1.04	1.09	1.21

CAL YR 1982 TOTAL 777630 MEAN 2130 MAX 5250 MIN 1070 CFSM 1.20 IN 16.25
WTR YR 1983 TOTAL 784620 MEAN 2150 MAX 4300 MIN 1160 CFSM 1.21 IN 16.40

04126520 MANISTEE RIVER AT MANISTEE, MI
(National stream-quality accounting network station)

LOCATION.--Lat 44°15'02", long 86°19'09", in SW1/4 SW1/4 sec.1, T.21 N., R.17 W., Manistee County, Hydrologic Unit 04060103, at upstream side of bridge on U.S. Highway 31, in Manistee, and 1.3 mi upstream from mouth.

DRAINAGE AREA.--2,000 mi^2, approximately.

PERIOD OF RECORD.--Water years 1975 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: November 1974 to September 1981.
WATER TEMPERATURES: November 1974 to September 1981.

INSTRUMENTATION.--Water-quality monitor March 1977 to September 1981.

REMARKS.--Bimonthly samples are collected as a cross-section sample at Washington Street bridge. Water-discharge measurements are made at times of sampling.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum daily, 1,680 micromhos Nov. 18, 1974; minimum, 226 micromhos Apr. 22, 1980.
WATER TEMPERATURES: Maximum, 26.5°C July 8, 1981; minimum, 0.0°C on many days during winter periods.

WATER QUALITY DATA, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DATE	TIME	STREAM-FLOW, INSTANTANEOUS (CFS)	SPECIFIC CONDUCTANCE (UMHOS)	PH (STANDARD UNITS)	TEMPERATURE (DEG C)	TURBIDITY (NTU)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)	COLIFORM, FECAL, 0.7 UM-MF (COLS./100 ML)	STREPTOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)
NOV										
03...	0930	2760	434	7.6	10.0	3.0	9.7	88	900	540
JAN										
26...	1130	2430	432	7.4	.5	4.0	11.8	82	200	120
MAR										
15...	1200	2750	393	7.7	4.5	2.5	12.5	97	K230	240
MAY										
17...	1330	2390	363	7.8	11.5	4.0	9.4	85	110	78
JUL										
26...	1245	1850	338	8.2	22.0	2.2	8.1	92	120	95
SEP										
13...	1400	1320	457	7.7	20.0	2.2	9.0	98	K220	66

DATE	HARDNESS (MG/L AS CACO3)	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	PERCENT SODIUM	SODIUM ADSORPTION RATIO	POTASSIUM, DISSOLVED (MG/L AS K)	ALKALINITY LAB (MG/L AS CACO3)	CARBON DIOXIDE DISSOLVED (MG/L AS CO2)
NOV									
03...	174	48	13	16	17	.5	1.3	150	7.2
JAN									
26...	187	55	12	12	12	.4	1.3	140	11
MAR									
15...	175	50	12	14	15	.5	1.1	140	5.4
MAY									
17...	163	47	11	7.9	9	.3	1.0	140	4.3
JUL									
26...	159	44	12	8.4	10	.3	.9	140	1.7
SEP									
13...	199	58	13	14	13	.4	1.2	150	5.8

DATE	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, DISSOLVED (MG/L AS F)	SILICA, DISSOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	SOLIDS, DISSOLVED (TONS PER AC-FT)	SOLIDS, DISSOLVED (TONS PER DAY)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N)
NOV									
03...	17	38	.1	8.1	248	230	.34	1850	.17
JAN									
26...	17	44	.1	8.7	243	234	.33	1590	.35
MAR									
15...	14	34	.1	7.4	235	217	.32	1740	.27
MAY									
17...	17	25	.1	6.4	207	200	.28	1340	.13
JUL									
26...	18	16	.2	5.5	231	189	.31	1150	<.10
SEP									
13...	15	48	.2	6.0	257	246	.35	916	<.10

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04126520 MANISTEE RIVER AT MANISTEE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DATE	NITROGEN, AMMONIA DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS, DISSOLVED (MG/L AS P)	PHOSPHORUS, ORTHO, DISSOLVED (MG/L AS P)	PHOSPHATE, ORTHO, DISSOLVED (MG/L AS PO4)	SEDIMENT, SUSPENDED (MG/L)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
NOV									
03...	.060	3.60	.030	.020	<.010	--	4	30	--
JAN									
26...	.070	<.10	.070	.050	.030	.09	6	39	99
MAR									
15...	.070	<.10	.020	.010	<.010	--	8	59	--
MAY									
17...	.030	.30	.040	.010	<.010	--	6	39	95
JUL									
26...	.020	.40	.040	.040	<.010	--	9	45	94
SEP									
13...	<.010	1.00	.020	.010	<.010	--	4	14	95

DATE	TIME	ALUMINUM, DISSOLVED (UG/L AS AL)	ARSENIC DISSOLVED (UG/L AS AS)	BARIUM, DISSOLVED (UG/L AS BA)	BERYLLIUM, DISSOLVED (UG/L AS BE)	CADMIUM DISSOLVED (UG/L AS CD)	CHROMIUM, DISSOLVED (UG/L AS CR)	COBALT, DISSOLVED (UG/L AS CO)	COPPER, DISSOLVED (UG/L AS CU)	IRON, DISSOLVED (UG/L AS FE)	LEAD, DISSOLVED (UG/L AS PB)
NOV											
03...	0930	<10	1	25	<1	<1	<1	<3	1	44	<1
MAR											
15...	1200	30	1	22	<1	1	4	<3	4	56	3
MAY											
17...	1330	<10	1	22	<1	1	1	<3	4	30	3
SEP											
13...	1400	10	2	38	<1	<1	<1	<3	1	7	1

DATE	LITHIUM DISSOLVED (UG/L AS LI)	MANGANESE, DISSOLVED (UG/L AS MN)	MERCURY DISSOLVED (UG/L AS HG)	MOLYBDENUM, DISSOLVED (UG/L AS MO)	NICKEL, DISSOLVED (UG/L AS NI)	SELENIUM, DISSOLVED (UG/L AS SE)	SILVER, DISSOLVED (UG/L AS AG)	STRONTIUM, DISSOLVED (UG/L AS SR)	VANADIUM, DISSOLVED (UG/L AS V)	ZINC, DISSOLVED (UG/L AS ZN)
NOV										
03...	8	5	<.1	<10	<1	<1	<1	240	<6.0	<4
MAR										
15...	7	10	.1	<10	1	<1	<1	230	<6.0	6
MAY										
17...	7	5	<.1	<10	<1	<1	<1	220	<6.0	<3
SEP										
13...	23	2	<.1	<10	<1	<1	<1	360	<6.0	21

04127000 BOARDMAN RIVER NEAR MAYFIELD, MI

LOCATION.--Lat 44°38'18", long 85°31'10", in SE1/4 NE1/4 sec.21, T.26 N., R.10 W., Grand Traverse County, Hydrologic Unit 04060105, on right bank 25 ft downstream from Brown's Bridge, 300 ft downstream from East Creek, 0.9 mi downstream from Brown's Bridge Dam, 1.0 mi northeast of Mayfield, and 9.6 mi southeast of Traverse City.

DRAINAGE AREA.--182 mi^2, revised.

PERIOD OF RECORD.--June 1952 to current year.

REVISED RECORDS.--WDR MI-80: Drainage area.

GAGE.--Water-stage recorder. Altitude of gage is 760 ft, by barometer.

REMARKS.--Records good. Flow regulated by hydroelectric powerplant 0.9 mi above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--31 years, 191 ft^3/s, 14.25 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,220 ft^3/s Sept. 14, 1961, gage height, 6.90 ft; minimum, 30 ft^3/s Jan. 15, 1965, gage height, 2.53 ft; minimum daily, 47 ft^3/s Nov. 2, 3, 1963.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 563 ft^3/s May 7, gage height, 5.11 ft; minimum, 78 ft^3/s Aug. 1, gage height, 3.02 ft; minimum daily, 101 ft^3/s Oct. 12.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	128	148	191	233	184	183	202	163	298	236	176	141
2	128	159	208	232	184	188	208	256	286	231	177	142
3	129	162	399	183	186	191	211	296	276	221	143	142
4	133	172	295	153	182	204	250	209	266	219	129	140
5	133	185	275	174	183	212	284	163	258	206	137	140
6	154	184	249	186	182	222	267	203	206	161	142	216
7	153	182	237	198	172	269	236	396	188	130	139	153
8	163	156	327	206	164	357	237	500	196	128	140	139
9	173	138	312	206	168	280	240	378	222	128	147	123
10	132	156	229	201	169	175	266	371	220	128	164	123
11	104	170	198	204	168	194	252	393	208	155	265	123
12	101	257	197	201	167	223	250	391	206	171	219	133
13	118	322	197	200	169	263	243	230	200	175	158	145
14	128	272	197	197	168	228	253	157	196	184	158	133
15	127	200	198	193	170	206	252	166	190	187	174	144
16	133	200	198	191	162	198	247	204	190	189	191	181
17	136	199	187	184	160	198	243	230	196	188	190	188
18	139	198	184	177	175	199	219	241	190	167	189	199
19	139	204	184	157	189	307	206	268	190	124	174	191
20	178	215	186	146	201	276	204	349	180	117	150	203
21	200	215	186	166	229	239	200	290	162	170	153	204
22	189	193	183	182	238	224	196	282	155	201	168	237
23	187	196	189	182	239	231	194	368	167	191	168	317
24	185	209	309	182	215	232	194	358	180	162	157	266
25	172	201	270	182	203	226	194	330	170	144	144	226
26	152	190	184	167	201	223	192	292	170	143	145	231
27	140	175	254	148	201	224	172	288	191	142	145	229
28	144	176	315	154	190	200	161	274	205	145	146	225
29	151	190	265	158	---	190	163	304	193	154	196	222
30	153	189	231	159	---	190	164	298	199	165	197	177
31	152	---	235	175	---	192	---	300	---	172	149	---
TOTAL	4554	5813	7269	5677	5219	6944	6600	8948	6154	5234	5130	5433
MEAN	147	194	234	183	186	224	220	289	205	169	165	181
MAX	200	322	399	233	239	357	284	500	298	236	265	317
MIN	101	138	183	146	160	175	161	157	155	117	129	123
CFSM	.81	1.07	1.29	1.01	1.02	1.23	1.21	1.59	1.13	.93	.91	1.00
IN.	.93	1.19	1.49	1.16	1.07	1.42	1.35	1.83	1.26	1.07	1.05	1.11

CAL YR 1982 TOTAL 62978 MEAN 173 MAX 487 MIN 101 CFSM .95 IN 12.87
WTR YR 1983 TOTAL 72975 MEAN 200 MAX 500 MIN 101 CFSM 1.10 IN 14.92

04127800 JORDAN RIVER NEAR EAST JORDAN, MI

LOCATION.--Lat 45°06'09", long 85°05'53", in NW1/4 NW1/4 sec.7, T.31 N., R.6 W., Antrim County, Hydrologic Unit 04060105, on right bank 600 ft downstream from Webster Bridge, 4.2 mi south of East Jordan and 4.5 mi upstream from mouth.

DRAINAGE AREA.--67.9 mi^2, revised.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--Occasional low-flow measurements, water years 1960-65. October 1966 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 610 ft, from topographic map, Nov. 19, 1959, to Sept. 30, 1966, nonrecording gage at present site and at site 600 ft upstream at same datum.

REMARKS.--Water-discharge records good except those for the winter period, which are fair. Some regulation during low flows by fish hatchery above station.

AVERAGE DISCHARGE.--17 years, 187 ft^3/s, 37.40 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,360 ft^3/s July 19, 1975, gage height, 6.51 ft; minimum, 91 ft^3/s Mar. 8, 1982, result of freezeup.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 400 ft^3 and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Nov. 12	1000	592	5.12	May 7	2400	*725	*5.41
Dec. 5	2200	552	5.00	May 20	0200	552	5.05
Dec. 24	0200	455	4.74	Sep. 23	0100	455	4.79

Minimum discharge, 144 ft^3/s July 19, 28, gage height, 3.02 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	181	164	197	189	183	200	178	170	210	177	204	151
2	172	199	224	187	184	205	179	225	189	165	168	152
3	163	183	304	183	184	212	201	194	186	161	161	152
4	160	174	208	180	179	234	213	178	185	162	172	150
5	159	171	362	183	180	237	188	172	188	158	162	151
6	182	174	382	183	181	227	181	258	182	157	157	172
7	179	169	225	190	180	221	186	638	176	156	154	186
8	168	169	199	185	179	239	183	438	174	155	152	164
9	163	165	185	184	179	256	179	226	181	154	151	159
10	168	175	181	194	178	204	225	200	175	153	159	158
11	167	204	183	220	175	188	195	189	172	153	252	159
12	171	502	180	197	176	182	182	183	170	153	169	158
13	174	243	179	188	179	182	182	179	168	151	157	159
14	190	196	181	185	181	183	205	194	165	151	155	164
15	177	190	183	183	185	181	192	204	165	151	158	161
16	177	185	183	185	192	179	184	183	165	151	154	182
17	175	184	172	185	200	178	181	179	165	151	157	191
18	168	183	176	188	194	182	177	177	164	150	174	206
19	168	188	180	188	192	300	173	270	163	149	158	179
20	252	212	184	188	226	212	174	358	161	149	153	244
21	233	204	181	188	234	185	174	217	160	151	166	257
22	184	184	179	190	208	180	172	203	159	152	198	403
23	173	181	231	190	210	181	171	257	158	150	163	333
24	169	179	340	187	199	174	172	253	158	150	157	199
25	167	179	260	187	184	174	173	253	158	149	155	180
26	166	181	222	183	175	177	172	211	158	148	156	179
27	164	176	196	181	183	181	171	194	204	148	156	172
28	167	184	239	179	192	181	170	187	180	164	156	170
29	166	218	231	184	---	177	172	297	163	179	154	166
30	164	210	197	185	---	174	173	240	172	163	155	165
31	163	---	190	188	---	176	---	225	---	157	154	---
TOTAL	5430	5926	6734	5807	5292	6162	5478	7352	5174	4818	5097	5622
MEAN	175	198	217	187	189	199	183	237	172	155	164	187
MAX	252	502	382	220	234	300	225	638	210	179	252	403
MIN	159	164	172	179	175	174	170	170	158	148	151	150
CFSM	2.58	2.92	3.20	2.75	2.78	2.93	2.70	3.49	2.53	2.28	2.42	2.75
IN.	2.97	3.25	3.69	3.18	2.90	3.38	3.00	4.03	2.83	2.64	2.79	3.08

CAL YR 1982 TOTAL 65005 MEAN 178 MAX 502 MIN 141 CFSM 2.62 IN 35.61
WTR YR 1983 TOTAL 68892 MEAN 189 MAX 638 MIN 148 CFSM 2.78 IN 37.74

04127800 JORDAN RIVER NEAR EAST JORDAN, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: October 1966 to current year.

INSTRUMENTATION.--Temperature recorder since October 1966.

REMARKS.--Temperature recorder clock stopped Apr. 12-20 (range in temperature 5.0 to 8.5°C), June 24 to July 25 (range in temperature 14.5 to 18.0°C), Sept. 19-30 (range in temperature 8.0 to 13.0°C).

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum, 20.0°C July 11, 1976; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum recorded, 18.5°C June 23, July 31; minimum, 0.0°C on many days during winter period.

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	14.5	13.5	10.0	9.5	5.5	4.5	1.5	1.5	3.0	3.0	4.5	4.5
2	13.5	12.5	9.5	9.5	8.0	5.5	1.5	1.5	3.0	3.0	4.5	4.5
3	13.0	12.5	9.5	9.5	8.5	8.0	1.5	1.5	3.0	3.0	4.5	4.5
4	13.0	11.5	9.5	8.5	8.5	6.5	1.5	1.5	3.0	3.0	4.5	4.5
5	12.0	11.5	8.5	7.5	6.5	6.5	2.5	1.5	3.0	3.0	5.5	4.5
6	13.0	12.0	7.5	6.5	6.5	5.5	2.5	2.5	3.0	3.0	5.5	5.5
7	13.0	13.0	6.5	6.5	5.5	5.0	2.5	2.5	3.0	3.0	7.0	5.5
8	13.0	12.0	7.0	6.5	5.0	4.5	2.5	2.0	3.0	2.5	7.0	7.0
9	12.0	11.0	7.0	7.0	4.5	4.5	2.0	2.0	2.5	2.5	7.0	5.5
10	12.0	11.0	7.0	7.0	4.5	4.5	2.0	2.0	2.5	2.0	5.5	4.5
11	12.0	11.5	8.0	7.0	4.5	3.5	2.0	2.0	2.0	2.0	4.5	4.0
12	11.5	11.0	8.5	8.0	3.5	3.5	2.0	1.0	2.5	2.0	4.0	3.5
13	11.0	11.0	8.0	6.5	3.5	3.5	1.0	1.0	3.5	2.5	5.0	4.0
14	11.0	11.0	6.5	6.0	4.0	3.5	1.0	1.0	3.5	3.5	5.0	5.0
15	11.0	10.0	6.0	6.0	4.5	4.0	1.0	.0	4.0	3.5	5.0	5.0
16	10.0	8.5	6.0	5.5	4.5	3.5	.0	.0	4.0	4.0	5.0	4.5
17	8.5	8.5	5.5	5.5	3.5	2.5	.0	.0	4.0	4.0	5.5	4.5
18	9.5	8.5	5.5	5.5	3.0	2.5	.0	.0	4.0	4.0	5.5	5.5
19	10.0	9.5	7.5	5.5	3.5	3.0	.0	.0	4.5	4.0	5.5	4.5
20	10.0	10.0	9.5	7.5	3.5	3.5	.0	.0	4.5	4.5	4.5	4.0
21	10.0	8.5	9.5	8.0	3.5	3.5	.0	.0	4.5	4.5	4.0	2.0
22	8.5	8.5	8.0	7.0	3.5	3.5	.0	.0	4.5	4.0	2.0	2.0
23	8.5	7.5	7.0	7.0	3.5	3.5	.5	.0	4.0	4.0	2.5	2.0
24	7.5	7.5	7.0	4.5	3.5	3.5	1.5	.5	4.0	3.0	2.5	2.0
25	7.5	7.5	4.5	4.5	5.0	3.5	1.5	1.5	3.0	2.5	2.5	2.0
26	7.5	7.5	4.5	4.5	5.0	4.0	1.5	1.5	2.5	1.5	4.0	2.5
27	8.0	7.5	4.5	4.5	4.0	4.0	1.5	1.5	4.0	2.0	4.0	4.0
28	9.5	8.0	4.5	3.5	4.0	4.0	1.5	1.5	4.5	4.0	4.5	4.0
29	10.0	9.5	3.5	3.5	4.0	2.0	2.5	1.5	---	---	4.5	3.5
30	10.0	10.0	4.5	3.5	2.0	2.0	3.0	2.5	---	---	4.5	4.0
31	10.0	10.0	---	---	2.0	1.5	3.0	3.0	---	---	5.0	4.5
MONTH	14.5	7.5	10.0	3.5	8.5	1.5	3.0	.0	4.5	1.5	7.0	2.0

04127800 JORDAN RIVER NEAR EAST JORDAN, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	6.0	5.0	10.5	7.5	13.0	8.5	---	---	18.0	15.5	15.0	12.5
2	6.0	6.0	10.5	8.5	13.5	10.5	---	---	17.0	14.0	15.0	12.5
3	6.0	5.0	8.5	7.5	13.5	11.0	---	---	17.0	15.0	16.5	14.0
4	5.0	5.0	9.5	7.0	12.0	11.5	---	---	15.0	14.0	16.0	14.5
5	6.5	5.0	10.0	7.0	11.5	10.5	---	---	16.0	13.5	15.5	14.5
6	6.5	6.0	9.5	7.5	13.0	9.0	---	---	17.0	14.5	15.5	15.0
7	6.0	6.0	7.5	7.5	13.5	10.5	---	---	17.5	15.0	15.0	12.5
8	6.5	6.0	9.0	6.0	12.5	9.5	---	---	17.0	15.5	13.5	11.5
9	6.5	6.0	9.5	6.0	15.0	12.0	---	---	16.5	13.5	15.5	13.0
10	6.0	6.0	10.5	6.5	15.5	12.0	---	---	15.0	12.0	16.0	14.5
11	6.0	6.0	12.0	8.0	16.5	12.5	---	---	14.0	12.0	16.0	14.5
12	---	---	13.0	9.5	17.0	14.0	---	---	15.0	12.0	14.5	12.0
13	---	---	14.0	11.5	18.0	14.5	---	---	15.5	12.5	12.0	10.0
14	---	---	14.0	10.0	18.0	15.0	---	---	15.5	14.0	11.5	10.0
15	---	---	11.0	8.0	18.0	15.0	---	---	16.0	12.5	11.0	.0
16	---	---	10.0	7.5	17.0	14.0	---	---	16.5	14.5	10.5	.0
17	---	---	10.5	7.0	16.5	13.0	---	---	16.5	14.5	11.5	10.5
18	---	---	11.5	8.0	15.5	12.0	---	---	16.0	14.0	12.5	11.0
19	---	---	11.5	10.0	16.5	12.5	---	---	17.5	14.5	---	---
20	---	---	10.5	10.0	17.0	13.0	---	---	17.5	15.0	---	---
21	8.0	5.0	12.0	8.5	17.0	14.0	---	---	16.0	13.5	---	---
22	8.5	5.5	12.0	11.0	17.5	14.5	---	---	15.0	13.5	---	---
23	9.5	6.5	11.0	9.5	18.5	15.5	---	---	14.5	12.0	---	---
24	9.0	6.5	11.5	8.0	---	---	---	---	15.0	12.5	---	---
25	9.5	6.0	11.5	9.0	---	---	---	---	15.0	13.5	---	---
26	10.5	7.5	9.0	7.5	---	---	16.5	14.0	16.0	14.5	---	---
27	13.0	10.5	10.5	7.0	---	---	17.0	14.0	16.0	14.5	---	---
28	12.0	9.0	12.0	8.5	---	---	17.0	15.5	16.5	14.5	---	---
29	9.5	7.5	12.0	10.0	---	---	16.0	14.5	16.5	14.5	---	---
30	10.5	6.0	10.0	9.0	---	---	18.0	15.5	15.5	14.5	---	---
31	---	---	9.5	9.0					15.5	13.5		
MONTH			14.0	6.0					18.0	12.0		

04127918 PINE RIVER NEAR RUDYARD, MI

LOCATION.--Lat 46°11'09", long 84°35'52", in NW1/4 NE1/4 sec.30, T.44 N., R.2 W., Chippewa County, Hydrologic Unit 04070002, on right bank 15 ft upstream from county highway bridge, 3.2 mi south of Rudyard.

DRAINAGE AREA.--184 mi^2.

PERIOD OF RECORD.--April 1972 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 600 ft from topographic map (nearest 10 ft). Prior to Aug. 4, 1972, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--11 years, 236 ft^3/s, 17.42 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,190 ft^3/s June 18, 1975, gage height, 17.62 ft; minimum, 53 ft^3/s July 29, 30, 1982, gage height, 1.83 ft.

EXTREMES OUTSIDE PERIOD OF RECORD.--A discharge of 50.3 ft^3/s was measured Aug. 6, 1963.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 1,200 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Oct. 20	1900	1,300	7.23	Apr. 14	1700	*2,380	*11.56
Nov. 12	1500	2,030	10.13	May 29	2100	1,300	7.18
Mar. 7	--	1,500	ice jam				

Minimum discharge, 60 ft^3/s July 27-29, Aug. 10; minimum gage height, 1.98 ft Aug. 10.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	156	174	436	360	185	210	255	185	639	75	64	65
2	145	171	394	340	185	210	294	320	426	78	64	63
3	137	219	428	325	185	220	352	456	322	83	64	62
4	133	309	443	315	180	230	664	344	288	91	67	62
5	129	321	421	305	185	270	650	273	582	97	69	62
6	167	314	380	290	185	350	556	236	356	90	68	69
7	248	265	340	280	185	900	515	511	294	87	66	89
8	298	249	300	275	185	1300	608	708	250	97	63	87
9	265	230	270	270	185	1000	529	423	224	103	62	78
10	288	226	250	265	185	800	723	310	223	94	61	73
11	450	471	240	255	185	600	679	256	197	86	69	75
12	358	1520	230	250	185	460	519	226	177	81	89	73
13	324	1280	225	245	185	398	625	204	156	76	75	68
14	276	708	220	240	185	380	1670	202	137	71	69	67
15	254	455	220	235	185	357	1690	245	120	68	66	66
16	288	395	220	230	185	341	1140	216	110	68	66	66
17	369	346	220	225	185	321	781	196	101	70	65	76
18	278	322	220	225	190	310	550	181	99	77	65	82
19	236	339	220	220	195	295	410	186	94	73	77	89
20	798	947	220	215	200	280	339	298	90	70	130	108
21	1010	854	220	215	200	270	291	264	88	68	107	148
22	629	539	230	210	205	260	263	228	85	66	98	129
23	401	395	240	210	210	250	246	218	80	65	90	113
24	340	319	280	205	210	240	223	220	78	64	80	101
25	260	263	400	200	210	230	210	239	76	64	73	90
26	230	250	580	200	210	225	202	244	74	63	71	86
27	214	240	540	200	210	220	191	222	74	61	72	85
28	199	230	500	195	210	215	191	197	74	60	70	81
29	196	260	460	195	---	213	184	608	72	63	68	77
30	198	310	420	190	---	212	188	943	69	65	67	76
31	186	---	390	190	---	224	---	810	---	65	66	---
TOTAL	9460	12921	10157	7575	5390	11791	15738	10169	5655	2339	2281	2466
MEAN	305	431	328	244	193	380	525	328	189	75.5	73.6	82.2
MAX	1010	1520	580	360	210	1300	1690	943	639	103	130	148
MIN	129	171	220	190	180	210	184	181	69	60	61	62
CFSM	1.66	2.34	1.78	1.33	1.05	2.07	2.85	1.78	1.03	.41	.40	.45
IN.	1.91	2.61	2.05	1.53	1.09	2.38	3.18	2.06	1.14	.47	.46	.50

CAL YR 1982 TOTAL 90523 MEAN 248 MAX 2270 MIN 54 CFSM 1.35 IN 18.30
WTR YR 1983 TOTAL 95942 MEAN 263 MAX 1690 MIN 60 CFSM 1.43 IN 19.40

04128000 STURGEON RIVER NEAR WOLVERINE, MI

LOCATION.--Lat 45°17'56", long 84°36'40", in SE1/4 NE1/4 sec.36, T.34 N., R.3 W., Cheboygan County, Hydrologic Unit 04070004, on left bank 1.8 mi north of Wolverine, 2.8 mi downstream from West Branch, and 9 mi upstream from mouth.

DRAINAGE AREA.--198 mi^2, revised.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--April 1942 to current year.

REVISED RECORDS.--WSP 1307: 1944(M), 1948(M), WSP 1727: 1951(M).

GAGE.--Water-stage recorder. Altitude of gage is 740 ft, from topographic map. Prior to June 15, 1942, nonrecording gage at site 1.0 mi upstream, and June 16, 1942, to Sept. 30, 1958, at site 0.7 mi upstream at different datums.

REMARKS.--Water-discharge records good except those for the winter period, which are poor. Prior to July 1975 intermittent regulation at low flows by ponds 2.4 mi above station.

AVERAGE DISCHARGE.--41 years, 218 ft^3/s, 14.95 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,290 ft^3/s Sept. 29, 1972, gage height, 3.72 ft; maximum gage height, 4.48 ft Sept. 14, 1961; minimum discharge, 94 ft^3/s Jan. 19, 1971, result of freezeup; minimum daily, 113 ft^3/s Aug. 6, 1958.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 862 ft^3/s May 7, gage height, 3.27 ft; minimum, 138 ft^3/s Jan. 16, gage height, 1.51 ft, result of freezeup.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	251	186	262	237	208	245	221	204	343	238	205	187
2	240	212	262	232	209	252	227	282	292	213	190	182
3	212	250	364	225	211	257	247	285	264	199	176	181
4	200	222	328	219	209	274	284	241	257	192	188	177
5	197	209	383	221	207	289	279	224	284	186	187	176
6	270	211	510	222	205	329	271	271	266	183	178	198
7	272	206	361	238	201	365	273	699	250	182	171	233
8	240	209	286	231	200	415	268	802	238	180	165	206
9	217	199	252	227	200	449	252	546	237	177	166	191
10	221	200	240	236	193	343	327	325	234	175	167	185
11	239	230	238	259	202	281	298	282	227	174	405	185
12	221	515	229	247	200	261	266	255	224	175	326	182
13	218	500	228	236	204	244	256	246	217	168	222	184
14	250	320	224	230	206	242	293	303	212	169	208	180
15	250	272	227	238	207	236	303	400	207	161	208	180
16	222	251	227	198	214	230	264	295	205	162	199	214
17	211	251	214	198	222	227	248	261	201	162	193	243
18	201	248	214	196	219	233	237	248	196	164	202	250
19	195	244	219	192	216	358	225	347	198	159	194	242
20	266	276	221	190	237	311	220	592	197	158	184	296
21	321	276	220	191	268	254	217	454	195	160	198	336
22	257	251	217	195	248	232	220	333	192	161	360	397
23	226	234	244	200	243	230	218	326	189	158	250	412
24	216	224	363	205	230	228	216	331	188	158	216	320
25	210	221	361	210	219	227	212	339	187	155	205	258
26	210	224	336	212	210	230	210	316	185	155	201	258
27	204	221	280	212	222	228	208	282	205	154	199	248
28	204	218	313	214	227	233	204	256	225	179	196	234
29	203	254	330	219	---	227	206	356	201	195	190	230
30	198	265	274	218	---	216	208	420	203	183	199	224
31	188	---	248	218	---	215	---	411	---	178	196	---
TOTAL	7030	7599	8675	6766	6037	8361	7378	10932	6719	5413	6544	6989
MEAN	227	253	280	218	216	270	246	353	224	175	211	233
MAX	321	515	510	259	268	449	327	802	343	238	405	412
MIN	188	186	214	190	193	215	204	204	185	154	165	176
CFSM	1.15	1.28	1.41	1.10	1.09	1.36	1.24	1.78	1.13	.88	1.07	1.18
IN.	1.32	1.43	1.63	1.27	1.13	1.57	1.39	2.05	1.26	1.02	1.23	1.31

CAL YR 1982 TOTAL 80895 MEAN 222 MAX 595 MIN 147 CFSM 1.12 IN 15.20
WTR YR 1983 TOTAL 88443 MEAN 242 MAX 802 MIN 154 CFSM 1.22 IN 16.62

04128000 STURGEON RIVER NEAR WOLVERINE, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: October 1958 to current year.

INSTRUMENTATION.--Temperature recorder since October 1958.

REMARKS.--Malfunction of the instrument Feb. 25-28, temperature recorder clock stopped Aug. 12-30 (range in temperature 13.5 to 19.0°C).

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMEPRATURES: Maximum, 24.0°C June 30, 1964; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum recorded, 22.0°C July 15, 16, 17; minimum, 0.0°C on many days during winter period.

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	15.5	14.5	9.5	9.0	4.5	3.5	1.0	.5	.5	.5	4.5	4.5
2	14.5	12.5	9.0	9.0	6.5	4.5	1.0	.5	.5	.5	4.5	4.5
3	13.5	13.0	9.0	9.0	7.0	6.5	.5	.5	.5	.5	4.5	4.0
4	13.5	11.5	9.0	8.0	7.0	6.0	.5	.5	.5	.0	4.0	4.0
5	13.0	11.5	8.0	7.0	6.0	5.5	1.0	.5	.0	.0	4.5	4.0
6	13.5	12.5	7.0	7.0	5.5	4.5	1.0	1.0	.5	.0	4.5	4.5
7	14.0	13.5	7.0	6.0	4.5	3.5	1.0	1.0	.5	.5	5.5	4.5
8	14.0	13.0	6.5	6.0	3.5	3.0	1.0	.5	.5	.0	5.5	5.0
9	13.0	11.5	6.5	6.0	3.0	2.5	.5	.5	.5	.0	5.5	4.5
10	12.0	12.0	6.5	6.5	2.5	2.0	1.5	.5	.5	.0	4.5	4.0
11	12.0	11.5	6.5	6.5	2.0	2.0	1.5	1.0	.0	.0	4.0	3.5
12	11.5	11.5	6.5	6.5	2.0	2.0	1.0	.5	.0	.0	4.0	3.5
13	11.5	11.0	6.5	5.5	2.0	1.5	.5	.5	.5	.0	5.0	3.5
14	11.0	11.0	5.5	5.5	1.5	1.5	.5	.5	1.5	.5	5.0	4.5
15	11.0	10.0	5.5	4.5	2.0	1.5	.5	.0	2.0	1.5	5.0	4.5
16	10.0	8.5	4.5	4.5	2.0	2.0	.0	.0	2.0	2.0	5.0	4.5
17	8.5	8.0	4.5	4.5	2.0	1.0	.0	.0	2.0	2.0	5.5	4.5
18	9.5	8.0	4.5	4.5	1.0	1.0	.0	.0	2.0	2.0	5.5	5.0
19	10.5	9.5	5.5	4.5	2.0	1.0	.0	.0	3.0	2.0	5.0	4.5
20	10.5	10.5	7.5	5.5	2.0	2.0	.0	.0	3.5	3.0	4.5	3.5
21	10.5	9.0	7.5	7.5	2.0	2.0	.0	.0	3.5	3.5	3.5	2.5
22	9.0	8.0	7.5	5.5	2.0	2.0	.0	.0	3.5	3.0	2.5	2.5
23	8.0	7.5	5.5	5.5	2.0	2.0	.0	.0	3.0	2.5	2.5	2.0
24	7.5	7.0	5.5	4.5	2.0	2.0	.0	.0	2.5	2.5	2.5	2.0
25	7.5	7.0	4.5	3.5	3.5	2.0	.0	.0	---	---	2.5	2.0
26	7.5	7.5	3.5	3.5	3.5	3.0	.0	.0	---	---	4.5	2.0
27	8.0	7.5	3.5	3.5	3.0	2.0	.0	.0	---	---	4.5	4.5
28	9.0	8.0	3.5	3.5	2.0	2.0	.0	.0	---	---	5.5	4.5
29	9.5	9.0	3.5	3.5	2.0	1.0	.5	.0	---	---	5.5	4.0
30	9.5	9.5	3.5	3.5	1.0	.5	.5	.5	---	---	5.5	4.0
31	9.5	9.5	---	---	.5	.5	.5	.5	---	---	6.0	4.5
MONTH	15.5	7.0	9.5	3.5	7.0	.5	1.5	.0			6.0	2.0

04128000 STURGEON RIVER NEAR WOLVERINE, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	6.0	5.0	10.5	9.0	13.0	9.5	18.5	16.0	19.0	16.5	17.0	14.0
2	6.0	6.0	10.5	9.0	14.0	11.0	19.5	17.0	18.5	15.5	16.5	14.0
3	6.0	5.0	9.0	8.0	14.0	11.5	21.0	18.0	18.0	16.0	18.0	15.5
4	5.0	5.0	8.5	8.0	13.0	12.0	21.0	19.0	16.0	15.5	18.0	16.5
5	6.0	5.0	10.0	8.0	12.0	11.0	19.5	16.0	17.0	14.5	17.5	16.0
6	6.0	6.0	9.5	8.0	13.0	10.0	16.5	14.0	18.0	15.0	17.5	16.5
7	6.0	6.0	8.0	6.5	13.5	11.5	16.5	14.0	19.0	16.0	16.5	14.0
8	7.0	6.0	8.5	5.5	14.0	10.5	19.0	15.0	19.0	17.0	15.5	13.5
9	7.0	6.5	9.0	6.0	15.0	12.5	19.5	17.0	18.5	15.5	17.5	14.5
10	6.5	6.5	10.0	7.0	16.0	12.5	19.5	15.5	17.0	14.0	18.0	16.0
11	6.5	6.0	11.5	8.0	17.0	13.5	20.5	17.0	15.0	13.5	18.0	16.0
12	8.5	6.0	13.0	9.5	18.0	15.0	21.0	18.5	---	---	16.0	14.0
13	8.5	7.5	14.0	11.5	19.0	16.0	20.5	17.0	---	---	14.0	12.5
14	9.0	7.5	14.0	11.5	19.0	16.5	21.0	17.5	---	---	12.5	12.0
15	9.0	7.0	11.5	9.5	19.0	16.5	22.0	19.0	---	---	12.0	11.5
16	7.0	6.0	10.5	9.5	18.5	15.5	22.0	19.5	---	---	11.5	11.5
17	6.0	5.5	10.5	8.0	18.0	14.5	22.0	19.5	---	---	12.0	11.5
18	6.0	5.0	11.0	8.0	17.0	14.0	21.5	19.0	---	---	13.0	12.0
19	5.5	4.5	11.0	9.5	17.5	14.0	21.5	18.5	---	---	13.0	12.0
20	7.0	4.5	10.0	9.5	18.0	14.5	21.0	18.5	---	---	12.5	12.5
21	8.0	5.5	11.0	9.0	18.5	15.5	21.0	18.5	---	---	12.5	11.5
22	8.5	7.0	11.0	10.5	19.0	16.0	20.0	17.0	---	---	11.5	10.5
23	8.5	7.0	10.5	9.5	20.0	17.0	19.5	18.0	---	---	10.5	9.5
24	8.5	7.0	11.0	8.0	20.0	16.5	20.0	17.5	---	---	10.5	9.5
25	8.5	7.0	11.0	9.5	19.0	16.0	19.5	17.0	---	---	10.5	10.0
26	10.0	6.0	9.5	8.5	20.0	17.0	19.0	16.5	---	---	12.5	10.0
27	13.0	10.0	11.5	8.5	20.0	16.5	19.0	16.5	---	---	12.5	12.5
28	12.5	11.0	12.0	9.5	16.5	14.0	19.0	17.0	---	---	13.5	12.5
29	11.0	9.0	12.0	10.5	17.0	14.0	18.0	16.5	---	---	13.5	12.5
30	10.5	9.0	10.0	9.5	17.0	15.5	19.5	17.0	---	---	13.5	12.5
31	---	---	10.0	9.5	---	---	19.5	17.5	17.0	15.0	---	---
MONTH	13.0	4.5	14.0	5.5	20.0	9.5	22.0	14.0			18.0	9.5

04129000 PIGEON RIVER NEAR VANDERBILT, MI

LOCATION.--Lat 45°10'15", long 84°26'18", in SE1/4 SW1/4 sec.9, T.32 N., R.1 W., Otsego County, Hydrologic Unit 04070004, on right bank at Pigeon River Headquarters, 11.1 mi east of Vanderbilt, and 26 mi upstream from Mullett Lake.

DRAINAGE AREA.--62.6 mi^2, revised.

PERIOD OF RECORD.--September 1950 to current year.

GAGE.--Water stage recorder. Datum of gage is 886.24 ft National Geodetic Vertical Datum of 1929.

REMARKS.--Records good except those for the winter period, which are fair. Prior to May 16, 1957, and since Apr. 22, 1958, occasional regulation by Lansing Club Dam, 3.5 mi above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--33 years, 77.7 ft^3/s, 16.86 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,500 ft^3/s May 15, 1957, gage height, 6.80 ft, from floodmark, from rating curve extended above 500 ft^3/s, result of failure of Lansing Club Dam; minimum, 13 ft^3/s Jan. 8, 1957.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 545 ft^3/s May 8, gage height, 5.53 ft; minimum, 35 ft^3/s June 24, gage height, 1.88 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983 MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	69	64	91	77	68	85	89	77	146	75	59	70
2	86	83	94	74	67	71	69	101	127	67	72	57
3	68	110	174	71	65	86	89	116	91	70	51	47
4	69	86	124	68	65	96	99	89	89	62	88	48
5	66	81	114	71	64	105	105	81	110	59	68	51
6	67	77	177	70	64	125	110	92	92	74	48	52
7	80	74	107	74	64	143	117	332	82	51	49	65
8	66	74	92	72	64	175	98	459	82	71	51	70
9	70	65	85	67	64	210	88	202	82	51	52	54
10	67	72	64	71	62	128	137	134	82	70	56	56
11	63	81	70	80	61	109	110	107	81	60	191	52
12	67	202	69	75	61	85	107	88	86	51	130	52
13	66	225	67	75	61	84	88	80	75	54	68	52
14	78	118	70	71	62	83	105	95	92	57	70	60
15	78	96	70	67	64	82	128	147	58	57	72	49
16	76	83	72	64	66	80	119	104	76	56	66	65
17	67	80	67	62	69	80	75	88	73	55	55	76
18	69	77	66	61	70	77	92	85	81	54	67	74
19	67	76	66	60	70	135	67	121	57	55	74	86
20	94	85	71	60	76	111	79	306	84	54	56	89
21	129	87	72	60	100	90	70	188	56	55	56	156
22	85	82	66	61	71	85	78	115	57	54	87	129
23	82	72	75	62	82	80	69	132	85	54	66	136
24	75	73	107	63	65	70	73	132	45	52	60	93
25	68	64	121	64	90	74	76	108	65	53	56	68
26	73	78	127	65	80	93	66	116	64	53	62	111
27	63	68	88	66	60	59	77	108	77	53	67	62
28	72	67	103	67	63	84	66	92	89	57	55	47
29	63	84	108	66	---	63	80	129	75	79	51	85
30	69	90	87	66	---	83	68	183	88	56	55	52
31	58	---	79	66	---	72	---	187	---	60	54	---
TOTAL	2270	2674	2843	2096	1918	3003	2694	4394	2447	1829	2112	2164
MEAN	73.2	89.1	91.7	67.6	68.5	96.9	89.8	142	81.6	59.0	68.1	72.1
MAX	129	225	177	80	100	210	137	459	146	79	191	156
MIN	58	64	64	60	60	59	66	77	45	51	48	47
CFSM	1.17	1.42	1.47	1.08	1.09	1.55	1.44	2.27	1.30	.94	1.09	1.15
IN.	1.35	1.59	1.69	1.25	1.14	1.78	1.60	2.61	1.45	1.09	1.26	1.29

CAL YR 1982 TOTAL 27246 MEAN 74.6 MAX 316 MIN 48 CFSM 1.19 IN 16.19
WTR YR 1983 TOTAL 30444 MEAN 83.4 MAX 459 MIN 45 CFSM 1.33 IN 18.09

04130500 BLACK RIVER NEAR TOWER, MI

LOCATION.--Lat 45°23'33", long 84°20'00", in SE1/4 NE1/4 sec.29, T.35 N., R.1 E., Cheboygan County, Hydrologic Unit 04070005, on right bank 400 ft downstream from Kleber Dam, 1,000 ft upstream from Milligan Creek, 3.0 mi northwest of Tower, and 10.8 mi upstream from Black Lake.

DRAINAGE AREA.--311 mi^2, revised.

PERIOD OF RECORD.--October 1942 to current year. Monthly discharge only for October 1942, published in WSP 1307.

REVISED RECORDS.--WSP 1307: 1942.

GAGE.--Water-stage recorder. Datum of gage is 658.00 ft Stanley Engineering Co. datum. Prior to Aug. 1, 1949, at site 1 mi upstream at different datum.

REMARKS.--Records good. Flow regulated by hydroelectric powerplant 400 ft above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--41 years, 270 ft^3/s, 11.79 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,340 ft^3/s Apr. 17, 1960, gage height, 7.13 ft; minimum, 0.60 ft^3/s Mar. 11, 1950; minimum daily, 4.0 ft^3/s Nov. 27, 1949.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,380 ft^3/s May 10, gage height, 5.47 ft; minimum, 10 ft^3/s Apr. 14, gage height, 1.23 ft; minimum daily, 120 ft^3/s Aug. 4.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	198	210	271	390	212	284	307	265	813	222	218	150
2	200	220	385	394	240	325	304	268	818	226	185	135
3	196	207	443	250	254	391	329	420	699	221	133	134
4	206	248	381	203	197	409	422	403	535	222	120	132
5	205	325	426	295	186	396	417	391	516	215	125	127
6	222	327	643	313	201	401	498	382	510	164	150	128
7	265	262	628	215	200	510	498	713	439	186	157	149
8	265	213	561	245	207	768	498	1190	474	158	175	156
9	261	210	530	220	203	892	498	1230	375	194	152	150
10	247	240	373	288	211	869	432	1350	340	178	155	149
11	236	265	263	280	207	832	501	1110	328	170	176	152
12	215	404	260	270	194	719	557	729	329	169	267	151
13	241	492	233	196	202	539	522	531	324	161	317	128
14	239	526	315	194	208	430	453	516	309	161	313	129
15	241	512	337	208	208	505	498	514	238	159	245	125
16	264	512	260	203	217	330	501	448	217	156	242	132
17	241	491	224	180	245	323	478	374	233	148	187	161
18	241	268	260	180	261	367	428	368	219	137	172	179
19	233	336	301	159	284	406	408	406	238	127	177	240
20	272	340	264	203	280	506	286	613	213	127	161	255
21	312	330	215	198	324	498	266	762	215	128	164	272
22	265	313	262	189	409	344	309	784	216	131	212	376
23	339	313	278	186	293	359	303	852	205	128	247	362
24	303	260	396	195	299	387	266	722	207	128	191	366
25	265	260	418	228	310	372	265	705	200	128	175	383
26	223	260	418	189	218	380	265	638	193	145	176	394
27	263	260	422	215	281	359	268	579	196	129	178	295
28	235	218	440	213	277	350	267	534	203	153	168	222
29	214	362	512	208	---	306	265	518	243	167	156	225
30	205	282	418	214	---	279	265	711	293	180	148	222
31	216	---	362	208	---	308	---	765	---	171	151	---
TOTAL	7528	9466	11499	7129	6828	14144	11574	19791	10338	5089	5793	6179
MEAN	243	316	371	230	244	456	386	638	345	164	187	206
MAX	339	526	643	394	409	892	557	1350	818	226	317	394
MIN	196	207	215	159	186	279	265	265	193	127	120	125
CFSM	.78	1.02	1.19	.74	.79	1.47	1.24	2.05	1.11	.53	.60	.66
IN.	.90	1.13	1.38	.85	.82	1.69	1.38	2.37	1.24	.61	.69	.74

CAL YR 1982 TOTAL 95381 MEAN 261 MAX 945 MIN 112 CFSM .84 IN 11.41
WTR YR 1983 TOTAL 115358 MEAN 316 MAX 1350 MIN 120 CFSM 1.02 IN 13.80

04132052 CHEBOYGAN RIVER AT CHEBOYGAN, MI
(National stream-quality accounting network station)

LOCATION.--Lat 45°38'02", long 84°28'52", in NW1/4 NE1/4 sec.6, T.37 N., R.1 W., Cheboygan County, Hydrologic Unit 04070004, at upstream side of bridge on Lincoln Avenue in Cheboygan, 1.75 mi upstream from mouth.

DRAINAGE AREA.--1,500 mi^2, approximately.

PERIOD OF RECORD.--Water years 1975 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: October 1974 to September 1981.
WATER TEMPERATURES: October 1974 to September 1981.

INSTRUMENTATION.--Water-quality monitor October 1976 to September 1981.

REMARKS.--Bimonthly samples are collected as a cross-section sample at Lincoln Ave. bridge. Water-discharge measurements are made at times of sampling. Flow regulated by dam 1,000 ft downstream.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE (water years 1975-78, 1981): Maximum daily recorded, 900 micromhos Apr. 24, 25, 1975; minimum daily recorded, 140 micromhos Mar. 8, 1975.
WATER TEMPERATURES (water years 1976-78, 1981): Maximum, 27.0°C July 20, 1977, July 8, 12, 13, 1981; minimum, 0.0°C on many days during winter periods.

WATER QUALITY DATA, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (STAND-ARD UNITS)	TEMPER-ATURE (DEG C)	TUR-BID-ITY (NTU)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)
NOV										
18...	0930	2030	308	7.9	3.5	2.4	13.1	99	K18	150
DEC										
16...	0930	2190	318	8.2	.5	2.0	12.6	88	--	38
FEB										
10...	0900	1620	331	7.9	.0	<1.0	13.5	93	K7	K11
APR										
14...	0945	2300	295	7.8	5.5	1.4	12.8	107	25	K370
JUN										
16...	0900	2030	303	7.9	21.5	2.0	8.6	98	K19	50
AUG										
25...	0900	E1020	293	8.0	23.0	2.3	8.9	103	K13	46

DATE	HARD-NESS (MG/L AS CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	PERCENT SODIUM	SODIUM AD-SORP-TION RATIO	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	ALKA-LINITY LAB (MG/L AS CACO3)	CARBON DIOXIDE DIS-SOLVED (MG/L AS CO2)
NOV									
18...	159	42	13	3.8	5	.1	.4	150	3.6
DEC									
16...	158	42	13	4.1	5	.1	.6	150	1.8
FEB									
10...	172	44	15	4.8	6	.2	.8	160	3.9
APR									
14...	149	40	12	4.0	5	.1	.7	140	4.3
JUN									
16...	162	45	12	4.0	5	.1	.7	150	3.6
AUG									
25...	159	42	13	4.0	5	.1	.7	140	2.7

DATE	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER AC-FT)	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)
NOV									
18...	13	4.8	.2	7.4	182	175	.25	998	<.10
DEC									
16...	14	5.0	.2	7.4	193	176	.26	1140	<.10
FEB									
10...	14	5.7	.2	8.5	173	189	.24	757	.11
APR									
14...	13	5.3	.1	6.6	174	165	.24	1080	<.10
JUN									
16...	11	4.8	.2	5.8	192	173	.26	1050	<.10
AUG									
25...	12	5.1	.2	7.9	175	169	.24	--	<.10

04132052 CHEBOYGAN RIVER AT CHEBOYGAN, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DATE	NITROGEN, AMMONIA DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS, DISSOLVED (MG/L AS P)	PHOSPHORUS, ORTHO, DISSOLVED (MG/L AS P)	PHOSPHATE, ORTHO, DISSOLVED (MG/L AS PO4)	SEDIMENT, SUSPENDED (MG/L)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
NOV 18...	.020	.80	.010	<.010	<.010	--	18	99	--
DEC 16...	.010	.30	.020	<.010	--	--	15	89	--
FEB 10...	.060	.20	--	.040	.030	.09	--	--	--
APR 14...	<.010	.30	<.010	<.010	<.010	--	4	25	100
JUN 16...	.030	.30	.010	<.010	<.010	--	1	5.5	100
AUG 25...	<.010	.40	.010	<.010	<.010	--	4	--	99

DATE	TIME	ALUMINUM, DISSOLVED (UG/L AS AL)	ARSENIC DISSOLVED (UG/L AS AS)	BARIUM, DISSOLVED (UG/L AS BA)	BERYLLIUM, DISSOLVED (UG/L AS BE)	CADMIUM DISSOLVED (UG/L AS CD)	CHROMIUM, DISSOLVED (UG/L AS CR)	COBALT, DISSOLVED (UG/L AS CO)	COPPER, DISSOLVED (UG/L AS CU)	IRON, DISSOLVED (UG/L AS FE)	LEAD, DISSOLVED (UG/L AS PB)
NOV 18...	0930	10	1	21	<1	<1	<1	<3	8	15	1
FEB 10...	0900	<10	1	22	<1	<1	<1	<3	1	10	1
APR 14...	0945	20	1	48	<1	<1	2	<3	4	12	4
AUG 25...	0900	<10	3	33	<1	<1	<1	<3	2	5	1

DATE	LITHIUM DISSOLVED (UG/L AS LI)	MANGANESE, DISSOLVED (UG/L AS MN)	MERCURY DISSOLVED (UG/L AS HG)	MOLYBDENUM, DISSOLVED (UG/L AS MO)	NICKEL, DISSOLVED (UG/L AS NI)	SELENIUM, DISSOLVED (UG/L AS SE)	SILVER, DISSOLVED (UG/L AS AG)	STRONTIUM, DISSOLVED (UG/L AS SR)	VANADIUM, DISSOLVED (UG/L AS V)	ZINC, DISSOLVED (UG/L AS ZN)
NOV 18...	<4	1	<.1	<10	7	<1	<1	88	<6.0	5
FEB 10...	<4	1	.3	<10	1	<1	<1	100	<6.0	<3
APR 14...	<4	1	<.1	<10	1	<1	<1	85	<6.0	7
AUG 25...	<4	<1	<.1	<10	1	<1	<1	97	<6.0	4

04135000 THUNDER BAY RIVER NEAR ALPENA, MI
(National stream-quality accounting network station)

LOCATION.--Lat 45°05'39", long 83°29'59", in SW1/4 SE1/4 sec.7, T.31 N., R.8 E., Alpena County, Hydrologic Unit 04070006, on left bank 1,000 ft downstream from Alpena Power Company Fourmile Dam, 2.5 mi upstream from Bagley Street in Alpena and 6.0 mi upstream from mouth.

DRAINAGE AREA.--1,238 mi^2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--Occasional measurements made water years 1945-50. October 1979 to current year.

GAGE.--Two water-stage recorders. Altitude of gage on main (north) channel and secondary gage on (south) channel is 615 ft, from topographic map.

REMARKS.--Water-discharge records good except those for the period of no gage-height record, Jan. 1 to Feb. 21, which are fair. Flow regulated at all stages by hydroelectric plant 1,000 ft above station.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 9,250 ft^3/s May 9, 1983; minimum daily, 33 ft^3/s Oct. 4, 1980, June 25, 1983.

EXTREMES FOR CURRENT YEAR.--Maximum daily discharge, 9,250 ft^3/s May 9; minimum daily, 33 ft^3/s June 25.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	921	627	902	1210	1040	1220	1130	565	3650	659	593	642
2	159	615	1160	1200	1060	1200	1280	1180	3250	274	572	658
3	111	590	1150	1180	1070	1410	1280	1460	3000	341	540	74
4	732	654	1130	1200	1060	1500	1620	1340	2840	313	754	128
5	653	612	1340	1190	530	1960	2030	1190	2280	766	721	237
6	634	121	1870	1190	1040	2040	2460	1250	1730	613	200	943
7	619	330	1850	1180	1120	2640	2410	2500	1630	624	231	591
8	631	859	1860	910	1120	3940	2140	5600	2010	622	611	578
9	100	638	1740	853	1120	4440	1720	9250	2080	213	610	589
10	80	651	1300	1050	952	4290	1940	6880	1760	186	620	102
11	609	658	991	1180	982	3360	2320	5810	1600	394	680	179
12	680	675	735	1160	535	2390	2500	3260	1600	478	594	526
13	607	558	875	879	712	1860	2110	2150	1600	354	49	509
14	643	972	916	945	1200	1640	2160	1860	1610	490	697	538
15	653	1170	1160	1110	929	1490	2130	1850	1440	590	996	500
16	109	1160	1150	567	1070	1410	2040	1520	974	220	716	142
17	110	1150	1150	795	1190	1250	2090	1460	999	157	698	134
18	663	1150	852	989	948	1250	1980	1500	829	639	681	139
19	597	1120	701	1150	778	1120	1640	1520	208	636	675	721
20	672	494	914	1050	879	1290	1520	1570	802	587	185	838
21	688	286	1120	1030	1160	2060	1420	2080	970	632	184	834
22	684	781	910	905	1240	2020	1220	2270	904	466	679	930
23	100	894	1160	1070	1390	2020	1180	2560	867	167	679	783
24	116	893	1160	1020	1540	2010	991	2480	790	154	648	162
25	623	563	1290	1110	1440	1920	1080	2450	33	537	605	491
26	622	721	1480	1110	1260	2010	1100	2370	132	476	553	895
27	626	560	1500	1110	1250	1860	883	2320	856	480	54	806
28	658	326	1960	967	1250	1360	959	2210	649	477	51	709
29	645	777	1560	818	---	1060	1050	2200	622	513	528	721
30	96	777	1590	869	---	1050	567	2590	778	147	590	610
31	97	---	1440	1040	---	1100	---	3240	---	59	643	---
TOTAL	14938	21382	38916	32037	29865	60170	48950	80485	42493	13264	16637	15709
MEAN	482	713	1255	1033	1067	1941	1632	2596	1416	428	537	524
MAX	921	1170	1960	1210	1540	4440	2500	9250	3650	766	996	943
MIN	80	121	701	567	530	1050	567	565	33	59	49	74
CFSM	.39	.58	1.01	.83	.86	1.57	1.32	2.10	1.14	.35	.43	.42
IN.	.45	.64	1.17	.96	.90	1.81	1.47	2.42	1.28	.40	.50	.47

CAL YR 1982 TOTAL 273517 MEAN 749 MAX 3670 MIN 34 CFSM .61 IN 8.22
WTR YR 1983 TOTAL 414846 MEAN 1137 MAX 9250 MIN 33 CFSM .92 IN 12.47

04135000 THUNDER BAY RIVER NEAR ALPENA, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--October 1979 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: October 1979 to current year.
WATER TEMPERATURE: October 1979 to current year.

INSTRUMENTATION.--Water-quality monitor since October 1980.

REMARKS.--In addition to water-quality monitor, samples were collected by a local observer on an approximate twice-weekly basis. Occasional samples are collected at Bagley Street bridge, 2.5 mi downstream. Water-discharge measurements are made at times of monthly sampling. February 1979 to September 1979, samples collected at site 6.9 mi downstream (04135020).

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum, 511 micromhos Jan. 2, 1982; minimum, 120 micromhos was observed Dec. 19, 1981.
WATER TEMPERATURES: Maximum, 31.0°C July 11, 12, 1981; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
SPECIFIC CONDUCTANCE: Maximum, 444 micromhos June 8; minimum, 239 micromhos was observed May 10.
WATER TEMPERATURES: Maximum, 30.0°C June 26, July 16, 17, 24, Sept. 3; minimum, 0.0°C on many days during winter period.

WATER QUALITY DATA, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DATE	TIME	STREAM-FLOW, INSTANTANEOUS (CFS)	SPECIFIC CONDUCTANCE (UMHOS)	PH (STANDARD UNITS)	TEMPERATURE (DEG C)	TURBIDITY (NTU)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)	COLIFORM, FECAL, 0.7 UM-MF (COLS./100 ML)	STREPTOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)
NOV										
17...	1045	1150	378	7.9	2.5	2.4	13.2	97	73	K320
DEC										
15...	1000	1190	388	8.0	1.0	6.0	12.9	92	--	120
FEB										
09...	0930	1240	394	7.6	.0	1.5	11.8	81	K3	30
APR										
13...	0945	2050	304	7.6	6.5	3.8	11.9	98	K10	250
MAY										
10...	0930	4670	239	7.4	8.5	10	10.1	86	K150	720
AUG										
24...	1030	1150	322	7.8	23.0	2.8	6.5	75	K19	200

DATE	HARDNESS (MG/L AS CACO3)	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	PERCENT SODIUM	SODIUM AD-SORPTION RATIO	POTASSIUM, DISSOLVED (MG/L AS K)	ALKALINITY LAB (MG/L AS CACO3)	CARBON DIOXIDE DISSOLVED (MG/L AS CO2)
NOV									
17...	193	54	14	5.2	6	.2	.9	180	4.4
DEC									
15...	190	53	14	5.6	6	.2	1.1	180	3.5
FEB									
09...	205	54	17	6.8	7	.2	.8	190	9.2
APR									
13...	151	44	10	4.1	6	.2	1.0	140	6.8
MAY									
10...	117	34	7.8	3.4	6	.1	1.4	110	8.5
AUG									
24...	170	45	14	4.6	6	.2	.4	160	4.9

DATE	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, DISSOLVED (MG/L AS F)	SILICA, DISSOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	SOLIDS, DISSOLVED (TONS PER AC-FT)	SOLIDS, DISSOLVED (TONS PER DAY)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N)
NOV									
17...	17	6.4	.1	8.8	237	215	.32	736	<.10
DEC									
15...	22	7.2	.2	9.4	252	221	.34	810	.16
FEB									
09...	14	5.9	.2	9.1	224	222	.30	750	<.10
APR									
13...	16	5.6	.1	3.9	186	169	.25	1030	<.10
MAY									
10...	10	3.9	.1	5.5	149	132	.20	1880	.19
AUG									
24...	12	4.4	.2	11	197	188	.27	612	.10

04135000 THUNDER BAY RIVER NEAR ALPENA, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DATE	NITROGEN, AMMONIA DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS, DISSOLVED (MG/L AS P)	PHOSPHORUS, ORTHO, DISSOLVED (MG/L AS P)	PHOSPHATE, ORTHO, DISSOLVED (MG/L AS PO4)	SEDIMENT, SUSPENDED (MG/L)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
NOV									
17...	.030	.60	.030	.020	<.010	--	6	19	--
DEC									
15...	.550	1.10	.030	.010	<.010	--	4	13	100
FEB									
09...	.050	--	.010	.010	<.010	--	2	6.7	--
APR									
13...	.030	.50	.050	.040	.010	.03	6	33	--
MAY									
10...	.040	.60	.050	.020	<.010	--	38	479	90
AUG									
24...	.020	1.20	.020	.020	<.010	--	6	19	96

DATE	TIME	ALUMINUM, DISSOLVED (UG/L AS AL)	ARSENIC DISSOLVED (UG/L AS AS)	BARIUM, DISSOLVED (UG/L AS BA)	BERYLLIUM, DISSOLVED (UG/L AS BE)	CADMIUM DISSOLVED (UG/L AS CD)	CHROMIUM, DISSOLVED (UG/L AS CR)	COBALT, DISSOLVED (UG/L AS CO)	COPPER, DISSOLVED (UG/L AS CU)	IRON, DISSOLVED (UG/L AS FE)	LEAD, DISSOLVED (UG/L AS PB)
NOV											
17...	1045	<10	1	26	<1	<1	<1	<3	4	57	1
FEB											
09...	0930	<10	1	30	<1	<1	<1	<3	<1	31	2
APR											
13...	0945	10	1	51	<1	<1	<1	<3	3	40	5
MAY											
10...	0930	50	1	45	<1	<1	1	<3	3	110	3

DATE	LITHIUM DISSOLVED (UG/L AS LI)	MANGANESE, DISSOLVED (UG/L AS MN)	MERCURY DISSOLVED (UG/L AS HG)	MOLYBDENUM, DISSOLVED (UG/L AS MO)	NICKEL, DISSOLVED (UG/L AS NI)	SELENIUM, DISSOLVED (UG/L AS SE)	SILVER, DISSOLVED (UG/L AS AG)	STRONTIUM, DISSOLVED (UG/L AS SR)	VANADIUM, DISSOLVED (UG/L AS V)	ZINC, DISSOLVED (UG/L AS ZN)
NOV										
17...	<4	6	<.1	<10	4	<1	<1	110	<6.0	32
FEB										
09...	<4	8	.3	<10	1	<1	<1	110	<6.0	3
APR										
13...	<4	5	.1	<10	1	<1	<1	91	<6.0	27
MAY										
10...	8	13	.1	<10	2	<1	<1	73	<6.0	13

04135000 THUNDER BAY RIVER NEAR ALPENA, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	395	352	367	382	373	378	383	380	381	390	367	383
2	386	342	360	407	372	390	387	383	385	393	312	379
3	375	348	365	423	367	393	387	383	385	402	365	387
4	373	360	365	412	366	388	421	383	395	409	365	381
5	373	358	364	411	363	386	400	370	386	407	362	382
6	370	355	364	414	379	396	404	358	384	413	351	378
7	371	359	363	404	377	394	405	369	388	407	368	391
8	399	355	368	392	388	390	400	359	377	409	363	382
9	377	353	365	405	391	396	392	349	380	408	301	374
10	375	341	364	398	385	391	397	351	382	407	367	383
11	388	362	369	410	381	392	375	371	374	405	377	392
12	384	361	368	410	362	390	399	374	384	408	380	401
13	387	364	369	394	388	391	409	365	385	409	385	403
14	387	365	373	397	389	393	414	368	394	409	379	395
15	386	366	373	388	385	386	422	389	403	397	369	388
16	385	359	373	388	385	387	424	398	414	---	---	---
17	384	362	376	388	384	385	419	388	403	---	---	---
18	385	370	375	385	383	384	419	387	407	---	---	---
19	386	368	376	385	382	383	424	391	402	---	---	---
20	384	364	369	383	379	382	418	366	401	---	---	---
21	373	353	359	396	380	383	415	402	411	---	---	---
22	372	356	363	398	377	383	417	373	403	---	---	---
23	382	353	368	381	375	378	414	383	406	---	---	---
24	385	365	377	378	374	376	412	364	398	---	---	---
25	385	366	375	381	376	379	398	351	376	---	---	---
26	382	367	373	389	377	381	402	359	373	---	---	---
27	384	368	374	388	384	385	394	344	370	---	---	---
28	378	367	372	386	373	382	391	349	374	---	---	---
29	384	369	374	398	378	384	392	348	358	---	---	---
30	383	356	371	394	380	383	381	330	359	---	---	---
31	381	350	370	---	---	---	386	336	364	---	---	---
MONTH	399	341	369	423	362	386	424	330	387			

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1				---	---	---	378	344	363	359	300	335
2				---	---	---	370	342	360	367	328	349
3				---	---	---	373	350	359	377	337	358
4				411	381	406	358	341	352	373	344	356
5				417	371	398	350	340	343	348	346	347
6				404	368	390	347	320	333	347	345	346
7				384	339	367	333	312	321	343	335	339
8				347	316	332	336	308	319	319	302	311
9				317	295	307	320	307	315	285	277	282
10				312	294	297	328	305	312	275	259	268
11				310	293	296	330	301	313	257	249	252
12				313	296	300	322	304	313	261	258	260
13				317	301	306	322	301	309	269	264	266
14				327	296	308	327	297	306	274	272	273
15				335	304	316	325	301	312	281	278	279
16				325	309	316	337	295	317	287	283	285
17				344	325	331	338	308	320	297	292	294
18				334	290	312	327	305	318	305	302	303
19				333	305	318	348	314	326	312	311	312
20				340	323	328	344	318	328	320	316	317
21				330	318	324	342	315	330	326	321	323
22				344	320	327	353	314	331	325	322	323
23				348	324	336	347	322	332	326	322	324
24				354	327	342	367	321	334	326	323	324
25				365	342	349	348	315	334	326	323	325
26				360	354	356	363	323	341	328	325	326
27				369	347	359	371	328	351	330	327	329
28				376	352	362	378	347	358	335	331	332
29				379	350	362	382	341	363	335	332	334
30				374	343	363	370	345	357	335	332	334
31				383	336	363	---	---	---	333	330	331
MONTH							382	295	332	377	249	314

04135000 THUNDER BAY RIVER NEAR ALPENA, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	333	331	332	387	286	346	---	---	---	321	314	316
2	335	332	333	378	338	348	---	---	---	337	313	316
3	339	335	337	391	336	352	---	---	---	321	299	312
4	344	338	340	366	333	345	---	---	---	321	297	308
5	343	339	340	348	343	345	---	---	---	322	299	314
6	338	334	335	348	343	345	---	---	---	321	310	312
7	420	334	356	350	342	345	---	---	---	319	308	312
8	444	385	411	350	341	344	---	---	---	321	314	317
9	405	368	383	350	336	342	---	---	---	322	313	317
10	375	343	359	361	334	343	---	---	---	328	304	315
11	357	346	352	351	318	343	---	---	---	325	298	312
12	350	346	348	349	335	343	---	---	---	321	315	317
13	345	342	344	344	336	340	---	---	---	322	316	319
14	340	338	339	343	319	338	---	---	---	328	305	319
15	340	321	333	343	323	335	---	---	---	337	314	322
16	353	337	346	368	311	336	---	---	---	326	308	319
17	357	350	354	341	322	332	---	---	---	326	307	321
18	357	351	354	335	327	331	---	---	---	327	306	318
19	378	346	363	356	319	331	---	---	---	327	320	323
20	358	335	345	373	320	339	---	---	---	335	315	323
21	364	333	340	330	321	325	---	---	---	360	308	324
22	380	340	355	335	316	322	---	---	---	323	321	323
23	376	331	354	354	301	328	---	---	---	346	308	326
24	371	344	356	332	303	319	---	---	---	335	319	328
25	361	327	349	338	303	323	326	306	314	346	308	330
26	365	310	348	361	315	328	327	314	320	337	329	334
27	356	324	349	343	320	323	326	303	316	356	337	342
28	367	344	350	328	304	323	334	303	321	350	344	346
29	385	344	361	328	314	323	335	279	319	410	346	356
30	392	342	353	---	---	---	325	311	317	358	345	351
31	---	---	---	---	---	---	324	310	315	---	---	---
MONTH	444	310	351	391	286	336				410	297	323

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	17.5	17.0	17.0	9.5	7.0	8.5	2.0	1.5	2.0	.5	.5	.5
2	20.0	13.0	16.0	9.5	9.0	9.5	2.5	2.0	2.0	.5	.5	.5
3	21.5	12.5	16.0	9.5	8.5	9.0	5.0	3.0	3.5	.5	.5	.5
4	17.0	11.5	15.0	9.0	4.5	8.0	5.5	4.5	5.0	1.0	.5	.5
5	16.5	12.0	15.0	8.5	4.0	7.0	6.5	5.0	6.0	1.0	.5	.5
6	17.0	14.0	16.0	8.0	4.0	5.0	7.0	6.0	6.5	1.0	.5	1.0
7	17.5	16.0	17.0	11.5	2.5	5.5	6.0	4.5	5.5	.5	.5	.5
8	17.0	14.0	16.0	6.5	6.0	6.5	4.5	3.0	3.5	.5	.5	.5
9	16.5	13.5	15.0	6.0	4.0	5.0	2.5	1.0	2.0	.5	.0	.5
10	15.5	13.5	14.5	6.0	4.5	5.0	1.0	1.0	1.0	.5	.5	.5
11	16.0	13.0	15.0	6.5	5.0	5.5	1.0	.5	.5	.5	.5	.5
12	15.5	11.5	14.5	8.0	5.5	6.0	.5	.5	.5	.5	.5	.5
13	15.0	11.5	14.0	5.5	5.0	5.0	1.0	.5	.5	.5	.5	.5
14	14.0	11.0	13.0	5.0	4.0	4.5	1.0	.5	.5	.5	.5	.5
15	13.0	8.0	11.5	4.0	3.0	3.5	1.0	.5	1.0	.5	.5	.5
16	12.0	6.0	9.0	3.0	2.5	3.0	1.0	.5	.5	---	---	---
17	12.0	6.0	8.5	2.5	2.5	2.5	1.0	.5	.5	---	---	---
18	11.0	8.0	10.0	2.5	2.0	2.0	1.0	.5	.5	---	---	---
19	10.5	9.0	10.0	3.0	2.0	2.5	1.0	.5	1.0	---	---	---
20	11.5	6.5	10.5	4.0	3.0	3.5	1.0	.5	1.0	---	---	---
21	9.5	5.0	8.0	7.0	2.0	4.0	1.0	.5	.5	---	---	---
22	9.0	5.5	8.0	4.5	1.5	3.5	1.0	.5	.5	---	---	---
23	13.5	3.5	7.0	5.0	4.5	5.0	1.0	.5	1.0	---	---	---
24	14.0	3.0	6.5	5.0	4.0	4.5	1.0	.5	1.0	---	---	---
25	8.5	3.0	6.5	4.0	3.5	3.5	1.0	.5	1.0	---	---	---
26	8.5	4.0	7.0	4.0	1.5	2.5	1.0	1.0	1.0	---	---	---
27	8.5	3.5	7.0	2.5	2.0	2.0	1.5	1.0	1.0	---	---	---
28	9.0	6.5	8.5	2.5	2.0	2.0	1.5	1.5	1.5	---	---	---
29	9.5	7.5	9.0	2.5	1.5	2.0	1.5	.5	1.0	---	---	---
30	14.0	7.0	9.5	2.0	1.5	1.5	.5	.5	.5	---	---	---
31	9.5	6.5	8.5	---	---	---	.5	.5	.5	---	---	---
MONTH	21.5	3.0	11.5	11.5	1.5	4.5	7.0	.5	1.5			

04135000 THUNDER BAY RIVER NEAR ALPENA, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1				---	---	---	2.5	1.5	2.0	12.0	11.0	11.5
2				---	---	---	2.5	2.0	2.5	11.5	11.0	11.5
3				---	---	---	2.0	2.0	2.0	11.0	10.0	10.5
4				.5	.0	.5	2.0	2.0	2.0	10.5	9.5	10.0
5				.5	.0	.0	2.0	2.0	2.0	10.0	9.0	9.5
6				.5	.5	.5	2.0	2.0	2.0	9.5	9.0	9.0
7				1.0	.5	.5	2.5	2.0	2.5	9.0	8.0	8.5
8				1.0	.5	.5	3.5	2.5	3.0	7.5	6.5	7.0
9				1.5	.5	1.0	4.0	3.5	4.0	8.0	7.0	7.5
10				1.5	1.0	1.0	5.0	4.0	4.5	10.0	8.0	9.0
11				1.0	.5	1.0	5.5	4.5	5.0	12.0	10.0	11.0
12				1.0	.5	1.0	6.0	5.0	5.5	13.5	12.0	12.5
13				1.5	1.0	1.5	6.0	6.0	6.0	14.5	13.5	14.0
14				2.0	1.5	1.5	6.5	6.0	6.0	15.0	14.5	14.5
15				2.5	1.5	2.0	6.0	5.5	6.0	14.5	13.5	14.0
16				2.5	2.0	2.5	5.5	5.5	5.5	13.5	13.0	13.5
17				3.0	2.5	2.5	5.0	4.5	5.0	13.0	12.5	13.0
18				3.5	3.0	3.0	4.5	3.5	4.0	13.5	12.5	13.0
19				3.5	3.0	3.0	4.0	3.0	3.5	13.0	12.5	12.5
20				3.0	2.5	2.5	4.0	3.5	4.0	12.5	12.0	12.5
21				2.5	.0	1.5	5.0	4.0	4.5	13.0	12.0	12.5
22				.0	.0	.0	6.5	5.0	5.5	13.5	13.0	13.0
23				.0	.0	.0	7.5	6.0	6.5	13.5	13.0	13.0
24				.5	.0	.0	9.0	7.0	8.0	13.0	12.5	12.5
25				.5	.0	.5	9.5	8.0	8.5	13.0	12.0	12.5
26				1.0	.0	.5	10.5	9.0	9.5	12.0	11.0	11.5
27				.5	.5	.5	12.0	10.5	11.0	11.0	10.5	11.0
28				.5	.0	.5	12.0	11.5	11.5	12.0	11.0	11.5
29				1.0	.0	.5	12.0	11.5	11.5	12.5	12.0	12.5
30				1.5	.5	1.0	12.5	11.5	11.5	12.5	12.5	12.5
31				2.0	1.0	1.5	---	---	---	12.5	12.0	12.0
MONTH							12.5	1.5	5.5	15.0	6.5	11.5

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	13.0	11.5	12.0	23.0	20.0	22.0	---	---	---	25.0	21.0	23.5
2	14.0	12.5	13.0	27.5	20.5	23.0	---	---	---	25.0	21.5	23.5
3	15.0	14.0	14.5	24.0	21.5	23.0	---	---	---	30.0	22.5	25.0
4	16.0	15.0	15.5	27.5	21.5	24.0	---	---	---	29.0	21.5	24.5
5	16.0	15.5	16.0	24.0	21.0	23.0	---	---	---	27.5	22.0	24.0
6	15.5	15.0	15.5	22.5	18.5	21.0	---	---	---	25.0	21.5	24.5
7	15.5	15.0	15.5	22.5	18.5	21.0	---	---	---	24.0	19.0	22.0
8	15.5	15.0	15.0	22.5	17.5	21.0	---	---	---	23.0	19.5	22.0
9	16.0	15.5	15.5	25.5	20.0	22.0	---	---	---	23.5	20.0	22.0
10	16.5	15.5	16.0	26.5	19.0	21.5	---	---	---	29.0	21.5	24.0
11	17.5	16.5	17.0	23.5	20.0	22.0	---	---	---	28.0	19.5	23.0
12	19.0	17.5	18.5	24.0	21.0	22.5	---	---	---	22.5	19.5	21.5
13	20.5	19.0	19.5	24.5	21.0	23.0	---	---	---	21.5	18.0	20.0
14	21.5	20.5	21.0	25.5	21.5	23.5	---	---	---	20.5	17.0	19.0
15	23.0	21.5	22.0	26.5	24.5	25.5	---	---	---	19.5	16.5	18.0
16	23.5	22.5	23.0	30.0	24.0	26.5	---	---	---	18.5	17.0	17.5
17	23.5	22.5	23.0	30.0	24.0	26.0	---	---	---	18.0	15.5	17.0
18	23.0	22.5	23.0	27.0	24.0	25.5	---	---	---	20.5	15.5	17.5
19	27.5	18.5	22.5	27.0	24.0	26.0	---	---	---	18.0	15.5	17.0
20	23.0	18.5	21.5	27.5	24.5	26.0	---	---	---	17.5	17.0	17.5
21	23.5	22.5	23.0	27.5	24.5	26.5	---	---	---	17.0	16.0	16.5
22	24.0	23.0	23.5	27.0	23.5	25.5	---	---	---	16.0	15.0	15.5
23	25.0	23.5	24.5	29.0	24.0	25.5	---	---	---	15.0	12.5	14.5
24	25.0	22.0	24.0	30.0	23.5	26.0	---	---	---	20.5	10.5	14.0
25	28.5	20.5	23.5	26.5	22.5	24.5	24.0	21.5	23.0	14.0	12.0	13.5
26	30.0	20.5	24.0	26.0	22.5	24.5	24.5	22.0	23.5	14.5	13.5	14.0
27	24.5	21.0	23.5	25.5	22.0	24.5	28.0	22.0	24.5	14.0	14.0	14.0
28	23.0	20.0	22.0	25.5	23.0	24.5	28.5	22.0	24.0	14.5	14.0	14.0
29	23.0	19.5	21.5	25.0	20.0	24.5	25.0	21.5	23.5	15.5	14.0	15.0
30	22.5	20.0	21.5	---	---	---	25.0	22.5	24.0	18.5	13.5	15.5
31	---	---	---	---	---	---	25.0	22.0	24.0	---	---	---
MONTH	30.0	11.5	19.5							30.0	10.5	19.0

04135500 AU SABLE RIVER AT GRAYLING, MI

LOCATION.--Lat 44°39'35", long 84°42'45", in SE1/4 SE1/4 sec. 7, T.26 N., R.3 W., Crawford County, Hydrologic Unit 04070007, on right bank 65 ft upstream from bridge on Interstate Highway 75 (Business Loop) in Grayling, 0.7 mi upstream from East Branch, and 114 mi upstream from mouth.

DRAINAGE AREA.--110 mi^2.

PERIOD OF RECORD.--October 1942 to current year. Monthly discharge only for some periods, published in WSP 1307. Prior to October 1954, published as Middle Branch Au Sable River at Grayling.

GAGE.--Water-stage recorder above steel-crested dam. Datum of gage is 1,123.49 ft National Geodetic Vertical Datum of 1929.

REMARKS.--Records good except those for the winter period, which are fair. Prior to Dec. 31, 1952, diurnal fluctuation caused by powerplant 2.5 mi above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--41 years, 74.2 ft^3/s, 9.16 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 274 ft^3/s June 2, 1943, gage height, 3.00 ft; minimum, 28 ft^3/s Apr. 21, 1946, gage height, 0.80 ft.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 202 ft^3/s May 8, 9, gage height, 2.35 ft; minimum, 51 ft^3/s July 20, 21, Aug. 8, gage height, 1.14 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	57	60	73	83	68	68	70	69	117	69	59	57
2	57	64	81	80	69	70	71	79	110	68	58	56
3	57	68	116	76	68	71	75	92	102	69	56	54
4	55	69	127	72	68	75	79	91	97	66	55	53
5	55	67	123	74	68	80	82	82	94	63	55	53
6	54	66	131	74	65	89	84	78	90	62	54	55
7	55	65	124	75	64	98	84	111	85	61	53	57
8	55	64	108	73	66	109	83	189	82	59	52	58
9	54	64	93	73	67	116	82	195	83	58	53	57
10	56	64	82	74	66	111	96	163	84	57	54	55
11	59	67	83	77	64	98	100	131	84	57	79	54
12	60	127	76	76	65	89	94	107	81	56	94	53
13	59	134	77	73	61	83	88	98	78	56	88	52
14	58	117	78	73	60	81	96	96	75	55	73	52
15	57	97	77	72	62	79	105	108	73	56	65	52
16	57	89	75	65	64	78	101	113	72	55	61	57
17	57	80	70	63	65	76	91	103	71	54	59	60
18	57	75	72	63	65	79	82	93	70	53	58	66
19	59	74	73	63	66	87	77	97	69	52	57	67
20	79	76	73	63	68	95	75	139	68	52	55	83
21	89	79	72	62	67	90	73	164	67	52	55	97
22	88	77	71	63	66	72	72	146	66	53	64	99
23	78	73	79	64	66	72	71	120	64	54	62	95
24	70	70	98	66	67	73	70	112	63	54	60	91
25	66	68	115	68	69	74	69	112	63	53	57	85
26	64	68	114	68	71	74	68	113	62	52	55	79
27	63	67	105	68	72	73	67	110	64	52	54	74
28	62	66	103	68	70	72	68	105	68	54	54	70
29	61	70	100	67	---	71	70	112	68	63	54	67
30	60	72	91	66	---	70	70	128	67	61	55	65
31	59	---	87	68	---	69	---	126	---	57	57	---
TOTAL	1917	2297	2847	2170	1857	2542	2413	3582	2337	1783	1865	1973
MEAN	61.8	76.6	91.8	70.0	66.3	82.0	80.4	116	77.9	57.5	60.2	65.8
MAX	89	134	131	83	72	116	105	195	117	69	94	99
MIN	54	60	70	62	60	68	67	69	62	52	52	52
CFSM	.56	.70	.84	.64	.60	.75	.73	1.06	.71	.52	.55	.60
IN.	.65	.78	.96	.73	.63	.86	.82	1.21	.79	.60	.63	.67

CAL YR 1982 TOTAL 24532 MEAN 67.2 MAX 178 MIN 47 CFSM .61 IN 8.30
WTR YR 1983 TOTAL 27583 MEAN 75.6 MAX 195 MIN 52 CFSM .69 IN 9.33

04135600 EAST BRANCH AU SABLE RIVER AT GRAYLING, MI

LOCATION.--Lat 44°40'08", long 84°42'20", in NW1/4 NW1/4 sec.8, T.26 N., R.3 W., Crawford County, Hydrologic Unit 04070007, on right bank, at south boundary of Michigan Department of Natural Resources field office in Grayling and 0.4 mi upstream from mouth.

DRAINAGE AREA.--76.0 mi^2.

PERIOD OF RECORD.--April 1958 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 1,110 ft, from topographic map. Prior to Sept. 30, 1958, nonrecording gage at site 10 ft downstream at present datum.

REMARKS.--Records good except those for the winter period, which are poor.
Occasional regulation by Michigan Department of Natural Resources ponds above station.
Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--25 years, 43.9 ft^3/s, 7.84 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 207 ft^3/s Mar. 28, 1976, gage height, 5.24 ft; minimum, 7.0 ft^3/s Mar. 27, 1965, result of freezeup; minimum daily, 16 ft^3/s Aug. 20, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 139 ft^3/s May 8, gage height, 4.54 ft; minimum, 24 ft^3/s Aug. 10; minimum gage height, 2.96 ft Feb. 26, result of freezeup.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	34	36	44	58	42	40	45	45	89	44	31	35
2	33	42	48	56	42	41	46	58	82	43	30	34
3	33	42	77	53	42	42	47	59	76	43	30	32
4	32	40	77	51	39	45	50	55	73	39	31	31
5	31	39	81	52	41	49	52	51	70	40	30	32
6	31	38	88	51	41	54	52	57	67	39	30	34
7	31	38	83	52	40	56	52	103	64	39	28	35
8	30	39	73	50	38	63	52	133	61	37	29	34
9	29	37	64	50	40	67	53	130	64	38	28	32
10	32	38	60	51	36	62	64	105	63	37	30	30
11	32	40	57	53	37	58	62	89	60	36	57	29
12	32	73	53	50	37	54	58	79	58	35	55	28
13	32	71	53	49	39	52	57	73	57	35	45	29
14	31	64	53	48	39	51	68	76	55	35	39	28
15	31	57	52	45	38	50	69	76	53	34	37	28
16	31	53	51	43	38	48	64	71	52	33	36	31
17	30	51	47	43	39	46	60	67	50	33	36	33
18	30	49	50	42	38	49	57	63	49	32	35	39
19	32	48	49	42	38	60	54	78	48	31	35	39
20	51	50	48	41	39	56	52	99	48	30	33	55
21	52	51	47	40	41	52	50	104	47	32	36	62
22	46	49	46	41	41	44	48	95	46	34	44	58
23	42	47	52	42	41	46	47	90	44	32	40	53
24	40	44	68	43	40	47	46	84	44	31	36	48
25	39	43	73	43	39	47	45	88	43	31	36	44
26	38	42	73	42	37	48	44	84	42	30	36	43
27	37	41	67	42	40	47	43	79	45	28	36	41
28	37	41	70	40	39	46	43	74	47	32	35	40
29	36	44	69	43	---	45	45	88	45	35	35	38
30	36	45	63	43	---	44	45	97	45	33	36	36
31	35	---	62	43	---	44	---	95	---	31	39	---
TOTAL	1086	1392	1898	1442	1101	1557	1570	2545	1687	1082	1114	1131
MEAN	35.0	46.4	61.2	46.5	39.3	50.2	52.3	82.1	56.2	34.9	35.9	37.7
MAX	52	73	88	58	42	67	69	133	89	44	57	62
MIN	29	36	44	40	36	40	43	45	42	28	28	28
CFSM	.46	.61	.81	.61	.52	.66	.69	1.08	.74	.46	.47	.50
IN.	.53	.68	.93	.71	.54	.76	.77	1.25	.83	.53	.55	.55

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CAL YR 1982   TOTAL   14121   MEAN 38.7   MAX 117   MIN 20   CFSM .51   IN 6.91
WTR YR 1983   TOTAL   17605   MEAN 48.2   MAX 133   MIN 28   CFSM .63   IN 8.62
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04135700 SOUTH BRANCH AU SABLE RIVER NEAR LUZERNE, MI

LOCATION.--Lat 44°36'53", long 84°27'20", in SE1/4 SE1/4 sec.29, T.26 N., R.1 W., Crawford County, Hydrologic Unit 04070007, on right bank 10 ft upstream from Smith Bridge, 400 ft downstream from bridge on State Highway 72, 4.6 mi upstream from mouth, and 9.1 mi west of Luzerne.

DRAINAGE AREA.--401 mi^2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--Occasional low-flow measurements, water years 1951-66. October 1966 to current year.

REVISED RECORDS.--WSP 2111: Drainage area.

GAGE.--Water-stage recorder. Altitude of gage is 1,070 ft, from topographic map. Apr. 19, 1951, to Nov. 14, 1966, nonrecording gage at same site and datum.

REMARKS.--Water-discharge records good except those for the winter period, which are fair. Occasional regulation by dams above station.

AVERAGE DISCHARGE.--17 years, 221 ft^3/s, 7.48 in/yr.

EXTREMES FOR PERIODS OF RECORD.--Maximum discharge, 1,120 ft^3/s Mar. 28, 1976, gage height, 7.30 ft; minimum, 78 ft^3/s Feb. 12, 1981, gage height, 3.98 ft, result of freezeup.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 550 ft^3/s June 1, gage height, 5.78 ft; minimum, 121 ft^3/s Aug. 9, 10, gage height, 4.24 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	201	185	246	305	200	178	303	287	542	159	153	136
2	185	211	256	295	202	188	313	316	499	159	136	131
3	175	223	357	276	203	202	327	326	453	164	132	128
4	167	229	377	255	198	220	349	327	416	166	130	127
5	164	229	405	260	200	256	361	324	396	159	130	126
6	162	227	470	260	194	299	370	320	372	152	128	129
7	162	222	463	257	192	344	374	388	353	148	125	134
8	159	219	435	240	189	437	375	531	333	145	124	135
9	156	213	388	248	191	459	370	519	325	144	123	130
10	161	212	349	253	188	435	411	531	313	142	126	127
11	165	220	316	265	185	397	421	488	302	139	229	128
12	168	305	298	246	185	359	410	421	293	136	249	128
13	165	326	289	253	183	328	396	387	280	132	198	126
14	161	320	277	251	181	309	435	369	267	130	165	126
15	159	314	273	240	182	292	464	367	257	130	153	124
16	159	298	271	235	186	278	465	345	249	130	146	138
17	156	278	250	230	192	269	457	327	241	130	141	148
18	155	261	258	225	195	269	424	315	235	129	138	163
19	157	250	254	218	200	298	393	340	230	127	135	172
20	194	253	251	212	205	311	370	384	221	126	131	236
21	226	262	249	210	219	302	353	390	204	134	134	263
22	229	262	249	210	225	264	339	411	187	137	168	261
23	225	260	254	205	228	263	332	416	168	140	166	261
24	210	256	291	201	211	264	324	402	158	135	153	237
25	192	246	326	202	178	280	314	408	151	131	143	225
26	183	239	355	203	166	280	305	415	148	128	140	231
27	176	224	361	201	179	291	300	400	149	126	138	226
28	172	208	376	206	171	290	294	391	158	132	135	220
29	171	221	370	200	---	280	293	453	158	137	136	212
30	170	239	334	199	---	288	292	514	155	138	134	204
31	171	---	318	200	---	298	---	532	---	135	141	---
TOTAL	5456	7412	9966	7261	5428	9228	10934	12344	8213	4320	4580	5132
MEAN	176	247	321	234	194	298	364	398	274	139	148	171
MAX	229	326	470	305	228	459	465	532	542	166	249	263
MIN	155	185	246	199	166	178	292	287	148	126	123	124
CFSM	.44	.62	.80	.58	.48	.74	.91	.99	.68	.35	.37	.43
IN.	.51	.69	.92	.67	.50	.86	1.01	1.15	.76	.40	.42	.48

CAL YR 1982 TOTAL 77903 MEAN 213 MAX 711 MIN 123 CFSM .53 IN 7.23
WTR YR 1983 TOTAL 90274 MEAN 247 MAX 542 MIN 123 CFSM .62 IN 8.37

04135700 SOUTH BRANCH AU SABLE RIVER NEAR LUZERNE, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: November 1966 to current year.

INSTRUMENTATION.--Temperature recorder since November 1966.

REMARKS.--Temperature recorder clock stopped Feb. 23-25 (range in temperature 2.0 to 3.0°C), no record Sept. 30.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum, 24.0°C July 16, 1968, July 20, 1977; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum, 22.5° July 15; minimum, 0.0°C on many days during winter period.

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	14.5	13.5	9.0	9.0	4.0	3.0	2.0	2.0	2.5	2.5	4.0	3.0
2	13.5	11.5	9.0	9.0	5.5	4.0	2.0	2.0	2.5	2.5	4.5	4.0
3	13.5	12.0	9.0	9.0	7.5	5.5	2.0	2.0	2.5	2.0	4.5	3.5
4	12.5	10.0	9.0	7.5	7.5	6.5	2.0	1.5	2.0	.0	4.0	4.0
5	12.0	10.0	7.5	6.0	6.5	6.0	2.5	2.0	2.0	.0	4.5	4.0
6	13.5	11.5	6.0	4.5	6.0	5.0	2.5	2.0	2.0	2.0	4.5	4.0
7	14.0	13.0	4.5	4.0	5.0	3.5	2.0	2.0	2.5	2.0	4.0	3.5
8	13.5	12.0	5.5	4.5	3.5	2.0	2.0	2.0	2.0	1.0	4.0	3.5
9	12.5	10.5	5.5	5.0	2.0	1.5	2.0	2.0	2.0	2.0	3.5	3.0
10	12.0	11.0	5.0	5.0	1.5	1.5	2.5	2.0	2.0	.0	3.0	2.5
11	11.5	10.0	5.5	5.0	1.5	1.5	2.5	2.0	.0	.0	3.0	2.0
12	11.0	10.5	6.5	5.5	1.5	1.5	2.0	1.0	.5	.0	3.0	2.0
13	10.5	10.0	6.5	5.0	2.0	1.5	2.0	1.0	2.5	.5	3.5	2.5
14	10.5	10.0	5.0	4.0	2.0	2.0	2.0	.5	3.0	2.5	4.0	3.5
15	10.0	9.0	4.0	3.0	2.5	2.0	.5	.0	3.0	3.0	4.0	4.0
16	9.0	7.5	3.0	2.5	2.5	2.0	.0	.0	3.0	3.0	4.0	3.5
17	8.5	7.5	3.0	2.5	2.0	1.5	.0	.0	3.0	3.0	5.0	3.5
18	10.0	8.5	3.0	3.0	2.0	1.5	.0	.0	3.0	2.5	5.0	4.5
19	10.0	9.5	4.5	3.0	2.5	2.0	.5	.0	3.0	2.5	4.5	4.0
20	10.0	9.0	6.5	4.5	2.5	2.5	.5	.0	4.0	3.0	4.0	3.0
21	9.0	8.0	6.5	6.0	2.5	2.5	.5	.0	4.0	3.5	3.0	.5
22	8.5	7.5	6.0	5.5	2.5	2.5	.5	.0	3.5	3.0	1.5	.5
23	7.5	6.5	5.5	5.0	2.5	2.5	.5	.5	---	---	2.5	.0
24	7.0	6.0	5.0	3.5	3.0	2.5	2.0	.5	---	---	2.0	.0
25	7.0	6.0	3.5	3.0	3.5	3.0	2.0	2.0	---	---	2.5	.0
26	7.5	6.5	3.0	3.0	3.5	3.0	2.0	.0	2.0	.0	3.0	.5
27	7.5	6.5	3.0	2.0	3.0	2.5	.0	.0	3.5	2.0	3.0	2.0
28	8.5	7.5	2.5	2.0	3.0	2.5	1.5	.0	4.5	3.0	3.0	2.0
29	9.0	6.5	3.0	2.5	4.0	2.0	2.5	1.5	---	---	3.5	2.0
30	9.5	8.5	3.0	3.0	2.0	1.5	2.5	2.5	---	---	3.0	2.0
31	9.5	9.0	---	---	2.0	1.5	2.5	2.5	---	---	3.5	2.0
MONTH	14.5	6.0	9.0	2.0	7.5	1.5	2.5	.0			5.0	.0

04135700 SOUTH BRANCH AU SABLE RIVER NEAR LUZERNE, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	4.5	2.5	12.0	9.5	13.5	11.5	19.5	15.0	20.0	17.0	17.5	14.0
2	4.5	3.0	12.0	10.0	14.0	12.5	19.5	16.5	20.0	15.5	17.5	14.0
3	3.0	3.0	10.0	9.0	14.5	13.5	20.5	17.0	19.5	16.0	18.5	15.0
4	3.0	3.0	9.0	7.5	14.5	14.0	20.5	18.0	16.5	16.0	18.5	15.0
5	4.0	3.0	10.5	8.0	14.0	13.5	18.5	15.0	19.5	15.5	18.0	15.5
6	4.5	4.0	10.5	9.5	15.0	13.0	17.0	11.5	20.0	16.5	17.5	16.0
7	5.0	4.5	9.5	8.0	16.0	13.5	17.0	12.5	21.0	17.0	16.5	13.5
8	6.5	4.5	9.0	7.0	15.5	13.0	18.5	14.0	21.0	18.0	16.0	12.5
9	6.0	5.5	10.0	8.0	16.0	14.0	20.0	16.0	19.5	16.0	17.5	14.0
10	5.5	5.0	11.5	9.0	18.0	14.5	19.5	14.5	18.5	14.5	19.5	15.5
11	5.0	5.0	13.0	10.5	19.0	15.5	20.5	16.0	15.5	14.5	19.0	15.5
12	7.0	5.0	14.5	12.0	20.0	17.0	21.5	17.0	17.5	13.5	16.0	14.0
13	7.0	6.5	16.0	13.5	21.0	17.5	20.5	16.0	18.5	14.5	14.0	11.5
14	7.5	6.5	16.0	14.0	21.0	18.0	21.5	16.5	18.5	15.5	13.0	10.5
15	7.5	5.5	14.0	12.0	21.0	18.0	22.5	18.0	20.0	16.5	12.0	10.0
16	5.5	4.5	13.0	11.0	20.0	17.0	22.0	18.5	20.5	17.0	11.5	11.5
17	5.5	5.0	12.0	9.5	20.0	16.0	22.0	18.0	20.0	18.0	12.5	11.5
18	5.5	5.0	13.0	10.5	19.0	15.0	22.0	18.0	20.5	16.5	14.0	12.0
19	5.5	4.0	13.0	12.0	19.0	14.5	22.0	18.5	21.5	17.5	14.0	12.5
20	6.5	5.0	12.0	11.5	19.5	14.5	22.0	17.5	21.5	18.0	13.5	13.0
21	8.0	6.0	13.0	11.0	20.0	15.5	21.5	18.0	19.5	15.5	13.5	12.0
22	9.0	7.0	13.0	13.0	20.0	16.0	20.5	15.5	18.0	16.5	12.5	11.0
23	10.0	7.5	13.0	12.0	20.5	16.5	20.0	17.5	17.5	14.0	11.5	10.0
24	10.5	8.5	13.0	10.5	19.5	15.5	20.0	16.5	19.0	15.5	11.0	9.0
25	10.5	6.0	13.0	12.0	19.5	14.5	19.5	15.5	18.5	15.5	11.0	10.0
26	11.5	9.0	12.0	10.5	19.0	16.0	20.0	15.0	19.0	16.0	13.0	10.5
27	13.5	10.5	11.5	10.0	19.0	15.0	19.5	15.5	19.0	16.5	12.5	11.5
28	13.0	11.0	12.5	11.0	17.0	13.0	19.0	17.0	20.0	16.0	14.0	12.0
29	11.0	9.5	12.5	12.0	17.0	13.0	19.0	16.5	19.5	16.0	14.0	12.0
30	11.0	9.0	12.0	11.5	17.0	14.5	21.0	17.5	19.0	17.0	---	---
31	---	---	11.5	11.5	---	---	21.0	17.5	18.5	15.5	---	---
MONTH	13.5	2.5	16.0	7.0	21.0	11.5	22.5	11.5	21.5	13.5		

04136500 AU SABLE RIVER AT MIO, MI

LOCATION.--Lat 44°39'36", long 84°07'52", in NW1/4 sec.7, T.26 N., R.3 E., Oscoda County, Hydrologic Unit 04070007, on right bank 150 ft upstream from bridge on State Highway 33 in Mio, 500 ft downstream from Mio hydroelectric plant, 9.5 mi downstream from Big Creek, and 73.0 mi upstream from mouth.

DRAINAGE AREA.--1,100 mi^2, approximately.

PERIOD OF RECORD.--July 1952 to current year.

GAGE.--Water-stage recorder. Datum of gage is 929.60 ft National Geodetic Vertical Datum of 1929.

REMARKS.--Records good. Flow regulated at all stages by hydroelectric plant 500 ft above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--31 years, 984 ft^3/s, 12.15 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,170 ft^3/s Mar. 28, 1976, gage height, 6.14 ft; minimum, 7.0 ft^3/s Aug. 4, 1977, gage height, -0.09 ft; minimum daily , 21 ft^3/s Aug. 9, 1977.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 3,170 ft^3/s May 8, gage height, 5.32 ft; minimum, 24 ft^3/s July 23, 24; minimum gage height, 0.27 ft Apr. 3, July 23, 24; minimum daily, 683 ft^3/s Sept. 13, 14.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	873	860	1100	1150	1020	948	1070	1070	1820	930	753	802
2	827	889	1060	1280	926	995	1130	1250	1790	895	780	726
3	793	989	1650	1130	944	1010	1340	1350	1630	973	766	708
4	787	1020	1390	1050	913	1090	1250	1280	1430	944	750	707
5	760	987	1780	1030	843	1160	1400	1190	1430	888	749	704
6	755	945	1770	1040	974	1370	1410	1170	1400	867	749	725
7	776	932	1670	1070	932	1480	1360	1840	1350	830	728	729
8	787	915	1480	1050	888	1820	1270	2830	1230	839	703	730
9	776	928	1300	999	886	2070	1290	2700	1190	820	710	729
10	776	912	1190	1020	873	1850	1500	2100	1270	777	696	728
11	798	921	1200	1100	756	1540	1530	1840	1200	820	914	714
12	798	1330	1100	1070	745	1370	1430	1640	1180	817	1080	692
13	810	1550	988	1040	984	1260	1330	1430	1160	745	1090	683
14	838	1410	1050	1030	1090	1220	1440	1380	1080	759	881	683
15	838	1160	1130	972	981	1160	1670	1380	1070	773	808	686
16	810	1210	1080	795	862	1140	1610	1330	1060	766	802	767
17	776	1050	1030	711	874	1110	1400	1320	1040	760	797	803
18	776	1090	1000	713	915	1090	1340	1240	987	760	787	853
19	804	1050	1000	794	853	1220	1280	1410	965	746	756	878
20	884	1050	1020	878	832	1420	1220	1760	993	739	744	1220
21	1050	1080	1020	929	839	1360	1140	1920	971	739	740	1260
22	1170	1100	998	980	939	1070	1170	1760	894	739	808	1130
23	950	1070	998	1030	1150	1030	1130	1700	914	687	876	997
24	962	1020	1340	985	1020	1130	1090	1620	886	729	829	1010
25	938	980	1440	982	986	1130	1090	1650	872	783	753	1030
26	894	987	1490	980	902	1120	1090	1650	861	723	739	959
27	836	980	1380	916	879	1120	1050	1520	861	716	739	931
28	834	953	1340	923	916	1120	1030	1370	905	723	737	920
29	855	935	1420	929	---	1130	1070	1820	904	763	724	897
30	855	965	1320	977	---	1070	1070	2150	904	771	791	872
31	856	---	1160	1100	---	1050	---	2050	---	758	832	---
TOTAL	26242	31268	38894	30653	25722	38653	38200	50720	34247	24579	24611	25273
MEAN	847	1042	1255	989	919	1247	1273	1636	1142	793	794	842
MAX	1170	1550	1780	1280	1150	2070	1670	2830	1820	973	1090	1260
MIN	755	860	988	711	745	948	1030	1070	861	687	696	683
CFSM	.77	.95	1.14	.90	.84	1.13	1.16	1.49	1.04	.72	.72	.77
IN.	.89	1.06	1.32	1.04	.87	1.31	1.29	1.72	1.16	.83	.83	.85

CAL YR 1982 TOTAL 346760 MEAN 950 MAX 2490 MIN 609 CFSM .86 IN 11.73
WTR YR 1983 TOTAL 389062 MEAN 1066 MAX 2830 MIN 683 CFSM .97 IN 13.16

04137500 AU SABLE RIVER NEAR AU SABLE, MI
(National stream-quality accounting network station)

LOCATION.--Lat 44°26'09", long 83°26'28", in NE1/4 NW1/4 sec.35, T.24 N., R.8 E., Iosco County, Hydrologic Unit 04070007, at bridge on REA Road, 5.5 mi northwest of Au Sable and 10.4 mi upstream from mouth.

DRAINAGE AREA.--1,540 mi², approximately.

PERIOD OF RECORD.--Water years 1978 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: April 1978 to September 1981.
WATER TEMPERATURES: April 1978 to September 1981.

REMARKS.--Bimonthly samples are collected as a cross-section sample at or near vicinity of bridge. Water-discharge measurements are made at times of sampling.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE (water years 1978, 1979): Maximum daily, 346 micromhos Nov. 21, 1978; minimum daily, 229 micromhos Apr. 19, 21, 1979.
WATER TEMPERATURES (water years 1978-80): Maximum daily, 26.0°C Aug. 12, 1980; minimum daily, 0.0°C on many days during winter periods.

WATER QUALITY DATA, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DATE	TIME	STREAM-FLOW, INSTANTANEOUS (CFS)	SPECIFIC CONDUCTANCE (UMHOS)	PH (STANDARD UNITS)	TEMPERATURE (DEG C)	TURBIDITY (NTU)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)	COLIFORM, FECAL, 0.7 UM-MF (COLS./100 ML)	STREPTOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)
NOV										
16...	1345	3500	301	8.2	6.0	1.4	12.0	98	K3	30
DEC										
14...	1315	3320	283	8.2	2.5	2.1	12.5	93	--	K7
FEB										
08...	1200	2360	292	--	.5	1.7	12.6	88	<1	K6
APR										
12...	1245	3370	261	7.5	5.5	1.2	13.6	109	K1	22
JUN										
14...	1100	3120	258	7.7	19.0	1.5	9.2	99	K2	21
AUG										
23...	1430	1200	280	8.2	20.5	<1.0	8.2	90	K2	220

DATE	HARDNESS (MG/L AS CACO3)	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	PERCENT SODIUM	SODIUM ADSORPTION RATIO	POTASSIUM, DISSOLVED (MG/L AS K)	ALKALINITY LAB (MG/L AS CACO3)	CARBON DIOXIDE DISSOLVED (MG/L AS CO2)
NOV									
16...	155	44	11	4.4	6	.2	.2	150	1.8
DEC									
14...	144	41	10	4.3	6	.2	.5	140	1.7
FEB									
08...	146	42	10	4.4	6	.2	.6	140	--
APR									
12...	131	38	8.8	4.1	6	.2	.5	120	7.3
JUN									
14...	137	40	9.0	3.8	6	.1	.6	120	4.6
AUG									
23...	153	43	11	5.4	7	.2	.4	140	1.7

DATE	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, DISSOLVED (MG/L AS F)	SILICA, DISSOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	SOLIDS, DISSOLVED (TONS PER AC-FT)	SOLIDS, DISSOLVED (TONS PER DAY)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N)
NOV									
16...	10	5.2	<.1	9.1	170	174	.23	1610	<.10
DEC									
14...	11	5.2	<.1	8.4	178	164	.24	1600	<.10
FEB									
08...	12	5.9	<.1	8.8	178	168	.24	1130	.15
APR									
12...	11	5.3	<.1	7.2	157	147	.21	1430	<.10
JUN									
14...	10	4.5	.1	6.7	173	147	.24	1460	<.10
AUG									
23...	9.1	5.3	.1	10	171	168	.23	554	<.10

04137500 AU SABLE RIVER NEAR AU SABLE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DATE	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS, DIS-SOLVED (MG/L AS P)	PHOS-PHORUS, ORTHO, DIS-SOLVED (MG/L AS P)	PHOS-PHATE, ORTHO, DIS-SOLVED (MG/L AS PO4)	SEDI-MENT, SUS-PENDED (MG/L)	SEDI-MENT, DIS-CHARGE, SUS-PENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
NOV									
16...	<.010	.30	.010	<.010	<.010	--	5	47	--
DEC									
14...	.010	<.10	.030	<.010	.010	.03	6	54	100
FEB									
08...	.040	--	.020	.020	<.010	--	3	19	100
APR									
12...	<.010	.20	.040	<.010	<.010	--	4	36	--
JUN									
14...	.030	.40	.100	<.010	<.010	--	5	42	74
AUG									
23...	<.010	.30	.010	<.010	<.010	--	4	13	96

DATE	TIME	ALUM-INUM, DIS-SOLVED (UG/L AS AL)	ARSENIC DIS-SOLVED (UG/L AS AS)	BARIUM, DIS-SOLVED (UG/L AS BA)	BERYL-LIUM, DIS-SOLVED (UG/L AS BE)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COBALT, DIS-SOLVED (UG/L AS CO)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, DIS-SOLVED (UG/L AS PB)
NOV											
16...	1345	--	2	32	<1	<1	--	<3	5	6	1
FEB											
08...	1200	<10	2	24	<1	2	<1	<3	2	40	1
APR											
12...	1245	20	1	49	<1	<1	<1	<3	4	18	5
AUG											
23...	1430	10	3	41	<1	<1	<1	<3	7	<3	1

DATE	LITHIUM DIS-SOLVED (UG/L AS LI)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY DIS-SOLVED (UG/L AS HG)	MOLYB-DENUM, DIS-SOLVED (UG/L AS MO)	NICKEL, DIS-SOLVED (UG/L AS NI)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	SILVER, DIS-SOLVED (UG/L AS AG)	STRON-TIUM, DIS-SOLVED (UG/L AS SR)	VANA-DIUM, DIS-SOLVED (UG/L AS V)	ZINC, DIS-SOLVED (UG/L AS ZN)
NOV										
16...	<4	2	<.1	10	8	<1	<1	69	<6.0	11
FEB										
08...	<4	10	.6	<10	1	<1	<1	66	<6.0	<3
APR										
12...	<4	<1	<.1	<10	1	<1	<1	60	<6.0	4
AUG										
23...	<4	<1	<.1	<10	1	<1	<1	75	<6.0	10

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04142000 RIFLE RIVER NEAR STERLING, MI
(National stream-quality accounting network station)

LOCATION.--Lat 44°04'21", long 84°01'12", in NE1/4 SW1/4 sec.5, T.19 N., R.4 E., Arenac County, Hydrologic Unit 04080101, on left bank 30 ft downstream from bridge on Old M-70, 2.8 mi north of Sterling, and 20 mi upstream from mouth.

DRAINAGE AREA.--320 mi^2, approximately.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--November 1905 to December 1908 (gage heights and discharge measurements only), October 1936 to current year. Monthly discharge only for some periods, published in WSP 1307. Published as Rifle River at Michigan Highway 70 near Sterling 1936-61.

REVISED RECORDS.--WSP 1437: 1937(M), 1939-40(M).

GAGE.--Water-stage recorder. Datum of gage is 649.48 ft National Geodetic Vertical Datum of 1929. November 1905 to December 1908, nonrecording gage at site 400 ft downstream at different datum. Jan. 13, 1937, to Jan. 10, 1939, nonrecording gage at same site and datum.

REMARKS.--Water-discharge records good except those for the winter period, which are poor. Occasional regulation by dams above station.

AVERAGE DISCHARGE.--47 years, 308 ft^3/s, 13.07 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 5,340 ft^3/s Mar. 28, 1950, gage height, 13.74 ft, from rating curve extended above 3,800 ft^3/s; minimum, 75 ft^3/s Nov. 22, 1964, result of freezeup.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 1,600 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Apr. 15	1300	*2,440	*8.30	May 30	1100	2,030	7.32
May 8	2200	2,240	7.83				

Minimum discharge, 128 ft^3/s Aug. 8, 9; minimum gage height, 1.39 ft Aug. 8-10.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	223	203	342	374	250	473	543	388	1140	256	147	199
2	226	250	448	332	250	548	608	641	851	230	142	183
3	223	257	1230	318	250	558	730	794	695	214	140	174
4	234	239	1100	312	250	568	994	676	618	202	145	166
5	221	228	897	325	240	707	995	603	590	188	143	163
6	212	221	1220	274	230	780	872	510	525	178	140	206
7	204	220	968	276	230	832	710	633	458	173	147	225
8	195	224	689	274	230	1020	624	2010	426	171	142	191
9	187	216	528	288	230	1210	581	1950	411	167	132	177
10	205	216	400	285	230	1020	963	1220	384	159	150	169
11	226	255	330	280	230	757	1070	828	341	156	528	165
12	218	303	310	270	230	603	837	644	334	152	435	161
13	205	354	310	260	230	521	742	570	328	147	273	161
14	202	310	310	250	230	491	1620	532	299	150	229	158
15	206	287	310	240	230	467	2340	542	287	146	214	157
16	238	256	307	230	230	423	1790	481	274	140	200	216
17	216	241	297	230	230	392	1120	424	259	134	190	275
18	209	232	309	230	230	385	843	398	242	137	183	335
19	198	229	279	225	230	511	694	596	241	149	176	377
20	216	272	279	225	230	593	602	1220	237	145	167	446
21	276	333	279	220	230	473	549	1030	222	147	161	780
22	251	325	270	220	230	360	507	767	209	165	265	581
23	237	296	267	225	240	360	466	807	201	154	264	407
24	264	298	334	240	240	360	413	702	195	158	210	326
25	236	272	520	250	250	360	423	750	190	152	190	295
26	222	259	605	250	260	360	387	966	189	140	180	299
27	214	251	513	250	300	373	378	757	215	135	177	285
28	211	251	503	250	386	415	347	588	254	145	172	269
29	201	304	622	240	---	490	405	1010	226	162	167	257
30	197	353	467	240	---	509	393	1950	242	158	212	233
31	196	---	435	240	---	505	---	1630	---	149	233	---
TOTAL	6769	7955	15678	8123	6826	17424	23546	26617	11083	5059	6254	8036
MEAN	218	265	506	262	244	562	785	859	369	163	202	268
MAX	276	354	1230	374	386	1210	2340	2010	1140	256	528	780
MIN	187	203	267	220	230	360	347	388	189	134	132	157
CFSM	.68	.83	1.58	.82	.76	1.76	2.45	2.68	1.15	.51	.63	.84
IN.	.79	.92	1.82	.94	.79	2.03	2.74	3.09	1.29	.59	.73	.93

CAL YR 1982 TOTAL 124279 MEAN 340 MAX 2260 MIN 140 CFSM 1.06 IN 14.45
WTR YR 1983 TOTAL 143370 MEAN 393 MAX 2340 MIN 132 CFSM 1.23 IN 16.67

04142000 RIFLE RIVER NEAR STERLING, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1966-72, 1975 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: November 1974 to September 1981.
WATER TEMPERATURES: November 1974 to September 1981.
SUSPENDED-SEDIMENT DISCHARGE: Water year 1970.

INSTRUMENTATION.--Water-quality monitor August 1975 to September 1981.

REMARKS.--Quarterly samples are collected as a cross-section sample at or near vicinity of bridge. Water-discharge measurements are made at times of sampling.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum recorded (water years 1976, 1977, 1979, 1980), 567 micromhos Sept. 6, 1979 (corrected); minimum recorded (water years 1975-77, 1980), 157 micromhos Aug. 31, 1975.
WATER TEMPERATURES (water years 1976, 1977, 1980): Maximum, 30.5°C July 20, 1977; minimum, 0.0°C on many days during winter periods.

WATER QUALITY DATA, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (STAND-ARD UNITS)	TEMPER-ATURE (DEG C)	TUR-BID-ITY (NTU)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)
OCT										
21...	1030	284	438	7.9	8.5	4.5	11.4	98	K64	K1200
MAR										
10...	1100	1030	322	7.7	3.0	24	13.0	99	K160	9500
MAY										
26...	1030	930	343	7.9	11.5	19	10.2	94	410	K6200
SEP										
01...	1030	194	419	7.8	19.0	3.3	9.6	103	K120	760

DATE	HARD-NESS (MG/L AS CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	PERCENT SODIUM	SODIUM AD-SORP-TION RATIO	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	ALKA-LINITY LAB (MG/L AS CACO3)	CARBON DIOXIDE DIS-SOLVED (MG/L AS CO2)
OCT									
21...	209	59	15	10	9	.3	.8	180	4.6
MAR									
10...	141	40	10	5.8	8	.2	2.0	130	5.0
MAY									
26...	179	50	13	8.8	10	.3	1.4	150	4.6
SEP									
01...	207	58	15	10	9	.3	1.0	180	5.5

DATE	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER AC-FT)	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)
OCT									
21...	30	15	.1	8.0	265	251	.36	203	.18
MAR									
10...	23	12	.1	5.9	204	177	.28	567	.61
MAY									
26...	21	12	.1	6.0	235	203	.32	590	.33
SEP									
01...	29	15	.2	8.6	260	245	.35	136	.10

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04142000 RIFLE RIVER NEAR STERLING, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DATE	NITROGEN, AMMONIA DISSOLVED (MG/L AS N)	NITROGEN,AMMONIA + ORGANIC TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS, DISSOLVED (MG/L AS P)	PHOSPHORUS, ORTHO, DISSOLVED (MG/L AS P)	PHOSPHATE, ORTHO, DISSOLVED (MG/L AS PO4)	SEDIMENT, SUSPENDED (MG/L)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
OCT 21...	.020	.60	.050	.010	.020	.06	33	25	--
MAR 10...	.070	.43	.070	.030	<.010	--	123	342	48
MAY 26...	.030	.60	.050	.020	<.010	--	109	274	36
SEP 01...	.010	1.40	.030	.010	.010	.03	11	5.8	91

DATE	TIME	ALUMINUM, DISSOLVED (UG/L AS AL)	ARSENIC DISSOLVED (UG/L AS AS)	BARIUM, DISSOLVED (UG/L AS BA)	BERYLLIUM, DISSOLVED (UG/L AS BE)	CADMIUM DISSOLVED (UG/L AS CD)	CHROMIUM, DISSOLVED (UG/L AS CR)	COBALT, DISSOLVED (UG/L AS CO)	COPPER, DISSOLVED (UG/L AS CU)	IRON, DISSOLVED (UG/L AS FE)	LEAD, DISSOLVED (UG/L AS PB)
OCT 21...	1030	20	3	61	<1	<1	<1	<3	2	40	<1
MAR 10...	1100	10	1	34	<1	<1	<1	<3	1	80	1
MAY 26...	1030	110	1	43	1	<1	<1	<3	1	78	3
SEP 01...	1030	10	4	70	<1	<1	<1	<3	1	19	<1

DATE	LITHIUM DISSOLVED (UG/L AS LI)	MANGANESE, DISSOLVED (UG/L AS MN)	MERCURY DISSOLVED (UG/L AS HG)	MOLYBDENUM, DISSOLVED (UG/L AS MO)	NICKEL, DISSOLVED (UG/L AS NI)	SELENIUM, DISSOLVED (UG/L AS SE)	SILVER, DISSOLVED (UG/L AS AG)	STRONTIUM, DISSOLVED (UG/L AS SR)	VANADIUM, DISSOLVED (UG/L AS V)	ZINC, DISSOLVED (UG/L AS ZN)
OCT 21...	<4	13	.2	<10	3	<1	<1	240	<6.0	16
MAR 10...	<4	8	.1	<10	1	<1	<1	130	<6.0	<3
MAY 26...	<4	5	.1	<10	2	<1	<1	180	<6.0	<3
SEP 01...	7	8	<.1	<10	1	<1	<1	230	<6.0	16

04143900 SHIAWASSEE RIVER AT LINDEN, MI

LOCATION.--Lat 42°48'56", long 83°48'08", in SW1/4 sec.19, T.5 N., R.6 E., Genesee County, Hydrologic Unit 04080203, on right bank at upstream side of bridge on Hogan Road, 1.0 mi west of Linden.

DRAINAGE AREA.--81.2 mi^2.

PERIOD OF RECORD.--October 1967 to current year.

GAGE.--Water-stage recorder. Datum of gage is 844.96 ft National Geodetic Vertical Datum of 1929.

REMARKS.--Records good. Flow regulated by dam at Linden since 1967. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--16 years, 60.3 ft^3/s, 10.08 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 476 ft^3/s Apr. 22, 1975, gage height, 7.43 ft, minimum, 0.74 ft^3/s May 22, 23, 1971; minimum gage height, 2.82 ft Aug. 2, 1971.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 160 ft^3/s May 3, gage height, 5.71 ft; minimum, 7.5 ft^3/s Sept. 8,9, gage height, 3.30 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	48	31	86	87	46	66	81	98	89	42	31	16
2	47	34	87	84	50	66	83	125	86	47	28	16
3	46	47	87	80	54	66	87	158	84	52	25	15
4	45	43	88	76	52	62	97	152	85	51	29	14
5	45	28	88	75	50	48	98	144	82	57	29	13
6	44	27	88	75	50	47	100	146	83	57	29	13
7	41	29	89	71	48	48	100	151	87	57	29	13
8	37	32	89	54	47	49	100	153	86	52	28	11
9	35	47	88	56	45	51	100	138	85	52	26	7.9
10	35	53	87	61	43	55	108	109	84	38	26	8.7
11	35	54	84	65	42	58	108	107	77	37	26	9.6
12	34	58	81	61	42	63	106	106	74	38	26	10
13	34	60	79	47	42	69	107	103	71	37	21	10
14	33	60	76	45	43	73	126	92	71	27	21	9.9
15	32	60	73	45	46	80	139	72	68	17	21	10
16	31	60	74	44	49	83	139	67	54	18	20	11
17	29	59	75	44	49	82	137	67	50	19	20	11
18	27	60	74	44	48	81	138	70	47	20	21	10
19	25	60	74	43	47	81	138	90	47	21	24	13
20	27	64	72	40	48	79	137	100	31	22	24	12
21	27	66	63	38	48	78	134	95	24	24	24	16
22	26	66	62	38	49	77	133	82	23	35	24	17
23	26	69	68	39	55	75	133	84	23	41	22	18
24	26	76	77	40	59	72	133	95	18	34	18	19
25	28	81	80	41	60	71	131	104	13	26	15	19
26	30	83	80	40	60	70	124	107	13	22	15	21
27	26	83	79	39	60	71	102	107	14	19	15	23
28	26	84	81	38	61	77	97	104	26	16	15	24
29	27	85	85	37	---	77	95	103	35	20	15	27
30	28	84	88	39	---	78	93	101	37	23	16	25
31	29	---	88	42	---	79	---	95	---	27	16	---
TOTAL	1029	1743	2490	1628	1393	2132	3404	3325	1667	1048	699	443.1
MEAN	33.2	58.1	80.3	52.5	49.8	68.8	113	107	55.6	33.8	22.5	14.8
MAX	48	85	89	87	61	83	139	158	89	57	31	27
MIN	25	27	62	37	42	47	81	67	13	16	15	7.9
CFSM	.41	.72	.99	.65	.61	.85	1.39	1.32	.69	.42	.28	.18
IN.	.47	.80	1.14	.75	.64	.98	1.56	1.52	.76	.48	.32	.20

CAL YR 1982 TOTAL 24670.0 MEAN 67.6 MAX 252 MIN 18 CFSM .83 IN 11.30
WTR YR 1983 TOTAL 21001.1 MEAN 57.5 MAX 158 MIN 7.9 CFSM .71 IN 9.62

04144000 SHIAWASSEE RIVER AT BYRON, MI

LOCATION.--Lat 42°49'25", long 83°56'45", in NE1/4 NE1/4 sec.23, T.5 N., R.4 E., Shiawassee County, Hydrologic Unit 04080203, on left bank at upstream side of highway bridge at Byron, 0.3 mi downstream from milldams which are just upstream from South Branch Shiawassee River.

DRAINAGE AREA.--368 mi^2.

PERIOD OF RECORD.--October 1947 to September 1983 (discontinued). Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1144: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 812.00 ft National Geodetic Vertical Datum of 1929. Prior to Oct. 17, 1960, nonrecording gage and crest-stage gage at same site and datum.

REMARKS.--Records good. Low flow slightly regulated at times by mills above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--36 years, 252 ft^3/s, 9.30 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,880 ft^3/s Apr. 22, 1975, gage height, 15.25 ft; minimum, 19 ft^3/s Aug. 16, 1965; minimum gage height, 3.55 ft Sept. 16, 1960.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,170 ft^3/s May 5, gage height, 8.84 ft; minimum, 30 ft^3/s Sept. 13, gage height, 4.06 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	161	121	354	310	185	255	597	522	387	503	121	52
2	156	180	346	291	198	254	558	632	390	455	125	52
3	153	327	414	275	247	256	562	767	375	378	118	53
4	150	311	452	250	270	254	572	1050	375	316	117	50
5	152	267	472	240	236	259	601	1170	393	204	113	44
6	151	239	454	230	225	267	598	1110	431	186	107	44
7	140	230	400	220	205	289	573	985	482	178	103	45
8	119	161	305	210	189	346	559	875	519	162	98	43
9	117	141	285	200	185	388	566	764	519	161	95	42
10	115	152	259	210	175	406	597	752	471	151	94	39
11	116	175	240	210	170	397	605	668	422	143	102	38
12	119	227	230	220	170	352	632	550	276	136	115	35
13	116	301	220	210	170	311	636	452	265	126	109	32
14	113	320	230	201	170	291	701	401	234	113	101	34
15	108	300	240	179	180	304	774	381	231	98	93	37
16	101	258	278	138	184	317	898	362	216	94	88	46
17	97	205	292	130	202	326	1010	334	212	81	86	75
18	93	178	282	145	225	321	992	279	207	80	84	109
19	91	170	263	160	230	336	916	288	193	85	114	127
20	91	195	264	159	240	358	865	326	179	75	86	119
21	91	231	277	152	264	377	840	401	175	73	40	128
22	91	257	271	154	284	360	827	480	169	77	53	121
23	91	258	265	159	308	351	804	540	168	79	58	113
24	89	256	293	165	330	349	722	633	160	79	59	112
25	75	260	360	170	332	328	638	574	149	77	59	109
26	82	255	405	166	301	298	563	572	138	77	55	98
27	92	244	425	157	272	301	539	589	123	76	52	95
28	96	234	436	155	259	426	535	524	218	74	55	104
29	95	270	407	152	---	513	526	453	370	75	48	107
30	89	334	379	161	---	598	523	408	475	94	49	94
31	90	---	345	177	---	631	---	372	---	110	50	---
TOTAL	3440	7057	10143	5956	6406	10819	20329	18214	8922	4616	2647	2197
MEAN	111	235	327	192	229	349	678	588	297	149	85.4	73.2
MAX	161	334	472	310	332	631	1010	1170	519	503	125	128
MIN	75	121	220	130	170	254	523	279	123	73	40	32
CFSM	.30	.64	.89	.52	.62	.95	1.84	1.60	.81	.41	.23	.20
IN.	.35	.71	1.03	.60	.65	1.09	2.05	1.84	.90	.47	.27	.22

CAL YR 1982 TOTAL 107893 MEAN 296 MAX 2060 MIN 43 CFSM .80 IN 10.91
WTR YR 1983 TOTAL 100746 MEAN 276 MAX 1170 MIN 32 CFSM .75 IN 10.18

04144500 SHIAWASSEE RIVER AT OWOSSO, MI

LOCATION.--Lat 43°00'54", long 84°10'52", in SW1/4 sec.12, T.7 N., R.2 E., Shiawassee County, Hydrologic Unit 04080203, on right bank on grounds of sewage-treatment plant, 1.5 mi north of Owosso.

DRAINAGE AREA.--538 mi^2.

PERIOD OF RECORD.--March 1931 to current year. Monthly discharge only for some periods, published in WSP 1307. Gage-height record for flood seasons collected in this vicinity 1904, 1910-30 are contained in reports of U.S. Weather Bureau.

REVISED RECORDS.--WSP 1307: 1949(M). WSP 1337: 1932, 1934, 1936-38, 1944.

GAGE.--Water-stage recorder. Datum of gage is 707.25 ft National Geodetic Vertical Datum of 1929. Prior to Oct. 15, 1933, at site 1.5 mi upstream at datum 5.46 ft higher.

REMARKS.--Records good. Flow regulated below about 800 ft^3/s by powerplant at Shiawasseetown prior to February 1953; occasional regulation at low stages since. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--52 years, 333 ft^3/s, 8.41 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 6,240 ft^3/s Apr. 6, 1947, gage height, 10.35 ft; minimum, 0.2 ft^3/s July 27, 1934, gage height, 1.12 ft; minimum daily, 2.0 ft^3/s July 28, 1934.

EXTREMES FOR CURRENT YEAR.--Peak discharge above base of 1,500 ft^3/s and maximum (*):

Date	Time	Discharge (ft /s)	Gage height (ft)	Date	Time	Discharge (ft /s)	Gage height (ft)
Apr. 14	2300	1,670	5.59	May 8	1600	1,870	5.91
May 2	1300	*2,260	*6.44				

Minimum discharge, 36 ft^3/s Sept. 15; gage height, 2.04 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	192	140	500	470	284	369	1130	1030	453	592	138	62
2	183	160	486	422	371	358	1040	2020	453	582	134	57
3	178	301	632	382	588	353	1240	1710	465	508	138	53
4	167	408	877	351	489	357	1210	1450	492	432	129	53
5	161	357	951	364	457	356	984	1480	497	366	125	54
6	161	309	956	342	398	368	898	1450	498	269	123	87
7	158	278	733	322	358	407	914	1370	523	229	112	67
8	147	263	589	313	331	562	877	1770	551	224	107	49
9	122	199	458	304	297	674	850	1550	562	201	102	48
10	121	185	416	306	297	641	1150	1190	543	199	103	45
11	118	213	376	315	294	607	1100	1030	493	186	130	50
12	117	316	319	324	286	552	975	855	426	176	126	43
13	119	385	321	325	280	486	946	704	326	165	130	40
14	116	397	342	319	280	435	1440	597	307	158	127	38
15	115	384	369	273	280	407	1590	532	266	138	119	37
16	110	352	392	206	300	412	1330	498	264	124	108	53
17	105	310	415	184	320	415	1320	462	249	104	103	54
18	99	260	407	238	350	439	1380	424	243	100	98	73
19	95	227	381	292	360	488	1330	395	239	89	94	124
20	99	300	39[illegible]	250	407	527	1290	419	231	90	101	150
21	93	403	406	240	427	539	1220	450	214	84	143	143
22	92	401	396	240	452	532	1130	560	208	81	85	139
23	90	404	398	249	515	511	1050	669	202	79	64	131
24	88	442	578	249	533	507	972	699	203	82	66	120
25	86	413	993	253	506	496	873	733	194	78	67	118
26	93	378	967	250	461	470	789	689	181	77	67	114
27	89	350	747	240	414	491	708	689	197	74	65	109
28	87	334	776	230	383	1060	740	662	249	85	61	99
29	91	384	747	219	---	1320	914	612	383	90	59	103
30	90	490	606	298	---	1170	914	544	513	77	63	110
31	85	---	524	317	---	1120	---	499	---	94	60	---
TOTAL	3667	9743	17456	9087	10718	17369	32304	27742	10625	5833	3147	2423
MEAN	118	325	563	293	383	560	1077	895	354	188	102	80.8
MAX	192	490	993	470	588	1320	1590	2020	562	592	143	150
MIN	85	140	319	184	280	353	708	395	181	74	59	37
CFSM	.22	.60	1.05	.55	.71	1.04	2.00	1.66	.66	.35	.19	.15
IN.	.25	.67	1.21	.63	.74	1.20	2.23	1.92	.73	.40	.22	.17

CAL YR 1982 TOTAL 160065 MEAN 439 MAX 3500 MIN 61 CFSM .82 IN 11.07
WTR YR 1983 TOTAL 150114 MEAN 411 MAX 2020 MIN 37 CFSM .76 IN 10.38

04145000 SHIAWASSEE RIVER NEAR FERGUS, MI

LOCATION.--Lat 43°15'17", long 84°06'20", in sec.22, T.10 N., R.3 E., Saginaw County, Hydrologic Unit 04080203, on right bank at downstream side of county highway bridge, 1.2 mi east of Fergus, 1.8 mi upstream from Bear Creek, and 14 mi above mouth.

DRAINAGE AREA.--637 mi^2.

PERIOD OF RECORD.--October 1939 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1337: 1940(M), 1941-42, 1943(M), 1944, 1945(M), 1946, 1947(M), 1948, 1950. WSP 1627: 1952, 1954(M), 1957.

GAGE.--Water-stage recorder. Datum of gage is 585.80 ft National Geodetic Vertical Datum of 1929. Prior to Aug. 22, 1968, nonrecording gage at same site and datum. Prior to Oct. 1, 1970, at datum 2.00 ft higher.

REMARKS.--Records good except those for the winter period and those for period of indefinite stage-discharge relation, June 14 to July 16, which are fair. Some regulation at low stages by powerplant above Owosso prior to February 1953; occasional regulation at low stages since. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--44 years, 422 ft^3/s, 9.00 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 7,500 ft^3/s Apr. 6, 1947 (includes overflow bypassing gage); maximum gage height, 15.44 ft, present datum, Mar. 29, 1960; minimum discharge, 27 ft^3/s Aug. 8, 1966; minimum gage height, 1.10 ft Sept. 15, 1983.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 3,300 ft^3/s May 2, gage height, 9.66 ft; minimum, 44 ft^3/s Sept. 15, gage height, 1.10 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	234	149	609	665	400	446	1660	1380	562	580	107	66
2	220	214	589	590	489	432	1630	2600	504	660	132	61
3	210	239	945	510	984	421	1890	2590	521	600	136	60
4	203	415	1380	500	885	420	1740	1820	607	520	137	57
5	201	453	1500	470	684	422	1360	1650	611	450	132	55
6	201	391	1610	450	600	420	1170	1640	577	350	127	57
7	197	342	1180	430	450	450	1140	1560	576	300	125	83
8	192	323	921	404	350	887	1170	2080	595	260	115	77
9	181	307	748	384	340	1080	1060	2070	615	240	110	58
10	162	240	624	375	330	901	1580	1540	615	230	105	53
11	160	241	574	389	330	806	1480	1270	566	220	119	54
12	153	387	500	401	340	736	1270	1110	515	200	132	55
13	151	534	430	392	340	655	1150	920	379	190	126	53
14	153	502	400	394	350	584	1730	778	360	180	121	48
15	158	475	430	390	350	523	2120	662	330	170	120	45
16	159	433	470	350	360	490	1670	597	300	150	113	50
17	153	385	500	280	380	497	1510	550	290	128	105	59
18	149	323	500	239	410	501	1610	508	280	115	102	69
19	145	278	480	236	450	556	1570	475	270	126	94	77
20	139	354	480	333	480	629	1480	524	260	106	93	128
21	148	518	490	310	520	662	1420	522	250	105	92	169
22	142	518	490	300	541	625	1310	614	240	110	138	140
23	139	501	569	300	615	612	1210	902	230	99	104	137
24	137	541	885	310	661	603	1140	833	230	97	74	132
25	135	533	1590	320	625	594	1040	882	220	95	69	127
26	133	469	1730	310	570	575	913	872	210	93	69	128
27	139	428	1190	310	514	574	813	784	210	91	70	126
28	134	395	1080	300	468	1030	779	800	240	92	70	122
29	131	427	1170	290	---	1820	1020	744	330	106	67	114
30	137	583	922	280	---	1690	1080	681	450	110	63	118
31	139	---	764	370	---	1470	---	611	---	101	67	---
TOTAL	5035	11898	25750	11582	13816	22111	40715	34569	11943	6874	3234	2578
MEAN	162	397	831	374	493	713	1357	1115	398	222	104	85.9
MAX	234	583	1730	665	984	1820	2120	2600	615	660	138	169
MIN	131	149	400	236	330	420	779	475	210	91	63	45
CFSM	.25	.62	1.31	.59	.77	1.12	2.13	1.75	.63	.35	.16	.14
IN.	.29	.69	1.50	.68	.81	1.29	2.38	2.02	.70	.40	.19	.15

CAL YR 1982 TOTAL 195429 MEAN 535 MAX 4050 MIN 77 CFSM .84 IN 11.41
WTR YR 1983 TOTAL 190105 MEAN 521 MAX 2600 MIN 45 CFSM .82 IN 11.10

04146000 FARMERS CREEK NEAR LAPEER, MI

LOCATION.--Lat 43°02'41", long 83°20'14", in sec.6, T.7 N., R.10 E., Lapeer County, Hydrologic Unit 04080204, on left bank at sewage-treatment plant at Michigan Home and Training School, 2.0 mi west of Lapeer.

DRAINAGE AREA.--55.3 mi^2.

PERIOD OF RECORD.--October 1932 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 924: 1940. WSP 1084: 1942(M), 1943. WSP 1337: 1934-38, 1940(M), 1944(M), 1945, 1946(M), 1948-51(M). WSP 1727: 1952 (M). WDR MI-78: Drainage area.

GAGE.--Water-stage recorder and concrete control. Datum of gage is 805.79 ft National Geodetic Vertical Datum of 1929. Prior to May 25, 1954, nonrecording gage at same site and datum.

REMARKS.--Records good. Prior to 1941, occasional regulation by dam above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--51 years, 30.3 ft^3/s, 7.44 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,280 ft^3/s Apr. 6, 1947, gage height, 19.87 ft, from floodmark, from rating curve extended above 660 ft^3/s on basis of contracted-opening measurement of peak flow; minimum not determined.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 144 ft^3/s Apr. 17, gage height, 16.53 ft, no peak above base of 160 ft^3/s; minimum, 2.7 ft^3/s Sept. 14, 15, 16, gage height, 15.08 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	17	12	35	45	18	38	70	61	31	15	16	5.4
2	16	21	35	40	21	36	65	83	29	15	14	5.0
3	14	26	39	33	25	34	63	68	30	15	13	4.9
4	13	26	42	32	27	34	60	70	35	13	12	4.6
5	11	25	46	30	27	34	59	87	38	12	11	4.0
6	10	22	49	27	24	37	57	96	43	11	10	4.4
7	10	24	51	25	23	40	56	91	46	9.6	9.5	4.1
8	10	34	53	24	21	44	53	86	47	8.5	8.6	3.9
9	10	42	51	23	20	48	53	76	46	7.7	7.9	3.7
10	10	38	47	25	18	49	58	68	41	6.8	7.6	3.4
11	11	36	42	27	17	49	62	62	35	6.4	10	3.2
12	10	34	39	27	17	47	68	56	30	5.7	12	3.1
13	9.3	33	36	27	16	43	72	50	26	5.3	11	2.9
14	9.3	32	29	26	16	40	87	45	22	4.9	10	2.9
15	8.6	29	27	25	16	37	96	41	19	4.6	9.2	2.7
16	8.2	27	32	23	18	34	115	37	16	4.5	8.5	3.3
17	7.9	25	32	22	21	32	140	33	15	4.4	7.8	3.3
18	7.6	22	32	20	23	31	138	30	13	4.5	7.2	4.4
19	7.6	21	33	18	25	33	123	28	12	6.2	6.7	6.8
20	7.2	24	35	17	29	34	109	31	11	7.6	6.1	10
21	6.8	29	35	16	31	35	98	32	10	8.9	5.7	20
22	6.8	47	36	16	35	36	91	38	9.3	10	6.3	24
23	6.8	68	37	17	41	37	84	45	8.4	11	6.5	26
24	5.9	66	40	18	43	36	75	48	7.6	12	6.4	34
25	5.3	55	45	19	46	35	67	52	6.8	12	6.1	41
26	5.9	48	49	18	46	34	59	54	6.1	11	5.8	37
27	6.5	43	54	17	44	36	53	52	6.5	10	5.5	28
28	7.6	38	60	17	41	45	51	50	11	9.7	5.3	25
29	7.2	38	58	16	---	51	50	47	13	9.6	5.0	32
30	7.6	36	57	17	---	61	54	44	15	18	4.9	35
31	7.6	---	49	18	---	70	---	37	---	17	5.2	---
TOTAL	281.7	1021	1305	725	749	1250	2286	1698	678.7	296.9	260.8	388.0
MEAN	9.09	34.0	42.1	23.4	26.8	40.3	76.2	54.8	22.6	9.58	8.41	12.9
MAX	17	68	60	45	46	70	140	96	47	18	16	41
MIN	5.3	12	27	16	16	31	50	28	6.1	4.4	4.9	2.7
CFSM	.16	.62	.76	.42	.49	.73	1.38	.99	.41	.17	.15	.23
IN.	.19	.69	.88	.49	.50	.84	1.54	1.14	.46	.20	.18	.26

CAL YR 1982 TOTAL 14567.3 MEAN 39.9 MAX 445 MIN 2.1 CFSM .72 IN 9.80
WTR YR 1983 TOTAL 10940.1 MEAN 30.0 MAX 140 MIN 2.7 CFSM .54 IN 7.36

04146063 SOUTH BRANCH FLINT RIVER NEAR COLUMBIAVILLE, MI

LOCATION.--Lat 43°09'34", long 83°21'03", in NE1/4 NE1/4 sec.36, T.9 N., R.9 E., Lapeer County, Hydrologic Unit 04080204, on right bank at upstream side of bridge on Columbiaville Road, 3.0 miles east of Columbiaville, and 3.2 miles upstream from confluence of North and South Branches.

DRAINAGE AREA.--221 mi^2.

PERIOD OF RECORD.--March 1980 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 765 ft, from topographic map.

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,510 ft^3/s Mar. 15, 1982, gage height, 8.34 ft; minimum, 18 ft^3/s Aug. 25, 26, 27, 1981; minimum gage height, 1.36 ft Aug. 26, 27, 1981, Sept. 14, 15, 16, 1983.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 657 ft^3/s May 3, gage height, 4.08 ft; minimum, 19 ft^3/s Sept. 14-16, gage height, 1.36 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	85	55	167	174	100	165	253	350	175	103	136	40
2	77	96	156	156	115	158	236	469	168	92	130	36
3	71	122	157	132	125	156	239	639	156	93	116	33
4	64	117	201	127	125	153	252	553	198	78	96	30
5	61	107	231	129	120	168	251	477	216	66	91	27
6	53	97	259	119	105	182	236	424	207	73	80	28
7	48	90	243	124	95	197	218	366	219	85	68	30
8	49	86	225	124	84	206	226	376	215	80	56	28
9	55	91	203	118	75	223	214	361	193	70	51	28
10	59	99	180	120	65	232	280	306	176	70	48	26
11	59	109	160	137	65	209	323	271	156	57	57	24
12	61	132	151	142	65	192	318	241	132	49	115	22
13	60	146	140	137	70	174	302	210	121	41	99	22
14	56	139	130	136	75	157	360	182	114	38	85	21
15	52	132	125	135	85	149	567	167	109	37	78	19
16	48	121	152	115	95	142	587	156	97	37	72	35
17	46	106	173	100	105	142	539	146	85	35	66	33
18	45	94	165	90	110	137	529	139	80	32	54	34
19	43	87	156	85	119	150	492	139	76	37	51	71
20	44	107	171	80	139	149	449	168	69	57	56	62
21	45	149	181	76	163	148	406	195	62	61	48	91
22	44	153	173	78	177	159	355	211	58	71	52	112
23	45	165	175	85	218	161	316	257	56	88	57	95
24	45	204	203	88	232	156	276	260	53	88	58	84
25	45	200	259	87	211	152	237	224	45	83	52	87
26	45	170	309	83	188	152	208	230	41	75	48	88
27	45	158	257	80	173	158	186	218	40	61	49	79
28	45	142	248	78	169	249	175	200	73	52	48	66
29	48	150	235	80	---	311	204	190	99	48	41	62
30	46	177	212	85	---	280	229	187	101	64	35	67
31	46	---	212	90	---	265	---	182	---	122	42	---
TOTAL	1635	3801	6009	3390	3468	5632	9463	8494	3590	2043	2135	1480
MEAN	52.7	127	194	109	124	182	315	274	120	65.9	68.9	49.3
MAX	85	204	309	174	232	311	587	639	219	122	136	112
MIN	43	55	125	76	65	137	175	139	40	32	35	19
CFSM	.24	.58	.88	.49	.56	.82	1.43	1.24	.54	.30	.31	.22
IN.	.28	.64	1.01	.57	.58	.95	1.59	1.43	.60	.34	.36	.25

CAL YR 1982 TOTAL 67874 MEAN 186 MAX 2430 MIN 30 CFSM .84 IN 11.42
WTR YR 1983 TOTAL 51140 MEAN 140 MAX 639 MIN 19 CFSM .63 IN 8.61

04147000 HOLLOWAY RESERVOIR NEAR OTISVILLE, MI

LOCATION.--Lat 43°07'15", long 83°29'45", in NW1/4 sec.11, T.8 N., R.8 E., Genesee County, Hydrologic Unit 04080204, in gatehouse on right side of Holloway Dam on Flint River, 3.5 mi southeast of Otisville.

DRAINAGE AREA.--526 mi^2.

PERIOD OF RECORD.--March 1954 to current year.

REVISED RECORDS.--WSP 2111: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is National Geodetic Vertical Datum of 1929 (levels by city of Flint).

REMARKS.--Reservoir is formed by an earth-fill dam with concrete spillway completed in 1953. Capacity of reservoir, 1,256,000,000 cu ft at elevation 760.00 ft. The spillway section includes two 90 foot drum gates with minimum crest elevation of 751 ft, maximum at 755 ft, three 20-foot radial gates with sill elevation of 745 ft, and 2 sluices (each 4 by 6 ft), one on each side with valve controls. Entrance elevation of sluiceways is 724 ft, Reservoir is used to regulate flow for sewage dilution for city of Flint.

COOPERATION.--Reservoir elevations furnished by city of Flint.

EXTREMES FOR PERIOD OF RECORD.--Maximum contents, 996,000,000 cu ft Mar. 8, 1956, elevation, 757.4 ft; minimum, reservoir empty at times during October, November, 1954, January, February, 1955, October, 1971.

EXTREMES FOR CURRENT YEAR.--Maximum contents, 841,000,000 cu ft May 4, elevation, 755.79 ft; minimum, 454,000,000 cu ft Jan. 25-30, elevation, 750.69 ft.

MONTHEND ELEVATION AND CONTENTS, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

Date	Elevation (feet)	Contents (millions of cubic feet)	Change in contents during month: Millions of cubic feet	Change in contents during month: Equivalent in ft^3/s
Sept. 30	754.85	756	--	--
Oct. 31	750.74	457	-299	-112
Nov. 30	751.37	495	+38	+14.7
Dec. 31	751.70	516	+21	+7.8
CAL YR 1982	--	--	+39	+1.2
Jan. 31	750.74	457	-59	-22.0
Feb. 28	751.12	480	+23	+9.5
Mar. 31	751.29	490	+10	+3.7
Apr. 30	755.07	776	+286	+11.0
May 31	755.37	803	+27	+10.1
June 30	754.93	764	-39	-15.0
July 31	754.87	758	-6	-2.2
Aug. 31	754.66	740	-18	-6.7
Sept. 30	754.67	741	+1	+0.4
WTR YR 1983	--	--	-15	-0.5

04147500 FLINT RIVER NEAR OTISVILLE, MI

LOCATION.--Lat 43°06'40", long 83°31'10", in SE1/4 sec.9, T.8 N., R.8 E., Genesee County, Hydrologic Unit 04080204, on left bank 20 ft downstream from bridge on State Highway 15, 1.5 mi downstream from Holloway Reservoir, 3.5 mi upstream from Powers-Cullen drain, and 3.8 mi south of Otisville.

DRAINAGE AREA.--530 mi^2.

PERIOD OF RECORD.--October 1952 to current year.

REVISED RECORDS.--WDR MI-78: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 721.39 ft National Geodetic Vertical Datum of 1929.

REMARKS.--Records good. Flow regulated by Holloway Reservoir, 1.5 mi above station (see preceding page). Several observations of water temperature were made during the year. City of Flint gage-height telemark at station.

AVERAGE DISCHARGE.--31 years, 302 ft^3/s, 7.74 in/yr, adjusted for storage since 1954.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 6,150 ft^3/s Apr. 1, 1960, gage height, 14.97 ft; minimum, 2.1 ft^3/s Oct. 11, 12, 1971, gage height, 1.57 ft.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,600 ft^3/s May 5, gage height, 9.67 ft; minimum, 78 ft^3/s Apr. 27, 28, gage height, 2.47 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	294	107	419	558	230	424	697	454	373	162	118	88
2	504	123	424	501	260	399	708	736	367	163	132	88
3	690	183	443	437	315	377	655	1240	350	151	131	90
4	686	228	492	346	347	361	650	1430	346	138	127	92
5	676	240	549	320	334	361	657	1490	371	131	121	92
6	676	253	588	311	327	372	632	1280	398	118	115	92
7	672	241	622	291	331	398	587	630	398	110	111	94
8	548	219	612	269	301	433	575	800	396	107	101	95
9	169	207	578	258	274	467	560	802	364	112	101	95
10	136	218	522	257	235	488	549	766	356	107	99	95
11	96	210	478	272	206	476	420	722	318	101	102	98
12	96	239	405	292	192	444	226	674	284	99	96	98
13	98	307	339	294	184	414	228	503	253	98	103	98
14	102	322	308	294	180	382	269	400	227	93	113	98
15	103	318	304	286	187	356	465	408	203	93	118	100
16	103	308	326	243	206	334	789	379	185	94	111	101
17	103	287	341	206	255	312	1130	344	175	95	105	100
18	102	262	352	203	310	308	1190	265	163	93	101	100
19	101	239	355	199	352	295	1120	214	154	93	95	101
20	103	261	373	183	388	331	1010	252	149	93	94	102
21	103	306	390	170	423	369	1000	308	141	92	95	102
22	103	351	400	160	454	348	1100	354	137	92	92	101
23	103	380	406	162	500	344	977	390	131	92	91	102
24	103	409	431	164	540	344	972	428	128	92	91	103
25	103	431	501	172	550	338	601	441	126	92	92	103
26	103	434	640	176	527	337	115	437	122	90	92	104
27	103	416	698	177	492	348	104	428	126	92	90	104
28	103	393	689	172	456	419	81	399	143	92	90	103
29	103	378	770	171	---	565	90	384	144	93	90	103
30	103	406	727	184	---	643	216	366	148	94	91	104
31	103	---	642	206	---	676	---	362	---	97	90	---
TOTAL	7191	8676	15124	7934	9356	12463	18373	18086	7176	3269	3198	2946
MEAN	232	289	488	256	334	402	612	583	239	105	103	98.2
MAX	690	434	770	558	550	676	1190	1490	398	163	132	104
MIN	96	107	304	160	180	295	81	214	122	90	90	88
MEAN +	120	304	496	234	344	406	722	594	224	103	96.5	98.6
CFSM +	.23	.57	.94	.44	.65	.77	1.36	1.12	.42	.19	.18	.19
IN +	.26	.64	1.08	.51	.68	.88	1.52	1.29	.47	.22	.21	.21

CAL YR 1982 TOTAL 146027 MEAN 400 MAX 4080 MIN 78 MEAN + 401 CFSM + .76 IN + 10.28
WTR YR 1983 TOTAL 113792 MEAN 312 MAX 1490 MIN 81 MEAN + 311 CFSM + .59 IN + 7.97

+Adjusted for change in contents in Holloway Reservoir.

04147990 BUTTERNUT CREEK NEAR GENESEE, MI

LOCATION.--Lat 43°08'09", long 83°35'57", in NE1/4 NE1/4 sec.2, T.8 N., R.7 E., Genesee County, Hydrologic Unit 04080204, on right bank 10 ft downstream from bridge on Frances Road, 2.3 mi upstream from mouth, and 2.0 mi northeast of Genesee.

DRAINAGE AREA.--34.7 mi^2.

PERIOD OF RECORD.--January 1970 to current year.

REVISED RECORDS.--WDR MI-78: Drainage area. WDR MI-81: 1971-72(P), 1973, 1974-79(P).

GAGE.--Water-stage recorder. Altitude of gage is 730 ft from topographic map (nearest 10 ft). Prior to June 11 1970, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--13 years, 21.6 ft^3/s, 8.45 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,800 ft^3/s Oct. 1, 1981, gage height, 9.00 ft; minimum, 1.2 ft^3/s Dec. 1, 1971, result of freezeup, Oct. 3, 1978; minimum gage height, 1.48 ft July 23, 27, 28, 1977.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 200 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Dec. 25	1500	213	6.67	Apr. 30	2100	203	6.52
Apr. 14	2100	251	7.21	May 2	1100	*308	*7.59

Minimum discharge, 1.5 ft^3/s Sept. 10, 14; minimum gage height, 1.49 ft Sept. 10.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	9.9	7.8	32	23	13	23	64	90	23	6.5	5.5	2.3
2	10	29	28	21	47	23	53	235	18	5.7	5.0	2.1
3	5.7	82	87	18	36	22	74	114	17	5.2	4.0	2.1
4	4.2	29	93	16	21	22	57	79	27	5.1	3.6	2.0
5	6.3	20	85	15	17	23	41	58	22	5.3	3.6	1.9
6	5.9	16	62	15	14	25	35	44	19	4.8	3.4	2.3
7	4.1	13	41	15	12	29	36	40	17	4.5	3.2	2.2
8	6.5	11	33	15	11	44	33	107	14	4.3	11	2.1
9	6.2	10	26	14	11	48	34	70	12	4.2	10	2.0
10	6.3	11	22	17	11	36	101	49	12	4.1	10	1.8
11	5.6	17	19	22	11	29	58	39	11	3.9	9.4	1.8
12	4.8	51	17	19	11	23	46	38	9.7	3.7	7.2	1.9
13	4.8	36	14	18	12	21	50	34	8.7	3.6	4.4	1.9
14	4.8	23	13	17	13	20	184	28	8.0	3.6	3.3	1.7
15	5.2	19	13	16	13	21	126	23	7.3	3.5	2.6	1.8
16	4.6	16	23	15	15	18	73	19	6.9	3.4	2.4	2.6
17	4.6	13	23	14	17	16	64	19	6.4	3.4	2.3	3.0
18	4.4	12	20	13	20	17	68	18	6.0	3.5	2.4	3.1
19	4.6	11	21	12	23	24	58	21	6.7	3.5	2.3	3.0
20	5.2	63	34	11	31	25	48	28	19	3.3	2.1	2.9
21	4.8	47	28	11	32	20	36	20	13	3.5	2.1	3.3
22	4.8	29	23	11	33	22	31	22	8.0	3.7	2.9	3.1
23	4.6	33	30	11	52	22	27	35	5.7	3.6	2.5	3.2
24	4.5	47	72	12	38	22	24	25	5.0	3.7	2.2	2.6
25	4.2	27	144	12	30	22	22	28	4.7	3.3	2.1	2.4
26	4.1	22	79	12	27	21	21	29	4.4	3.1	2.1	2.3
27	4.2	19	52	11	24	29	20	21	6.1	3.1	2.2	2.2
28	4.4	18	66	11	23	106	33	18	14	3.3	2.3	2.2
29	8.4	64	48	9.9	---	92	47	17	10	3.5	2.2	2.1
30	5.2	46	34	24	---	64	91	18	7.4	4.4	2.2	2.1
31	5.0	---	27	17	---	62	---	22	---	4.8	2.4	---
TOTAL	167.9	841.8	1309	467.9	618	901	1655	1408	349.0	125.1	122.9	70.0
MEAN	5.42	28.1	42.2	15.1	22.1	32.0	55.2	45.4	11.6	4.04	3.96	2.33
MAX	10	82	144	24	52	106	184	235	27	6.5	11	3.3
MIN	4.1	7.8	13	9.9	11	16	20	17	4.4	3.1	2.1	1.7
CFSM	.16	.81	1.22	.44	.64	.92	1.59	1.31	.33	.12	.11	.07
IN.	.18	.90	1.40	.50	.66	1.06	1.77	1.51	.37	.13	.13	.08

CAL YR 1982 TOTAL 9084.6 MEAN 24.9 MAX 480 MIN 3.3 CFSM .72 IN 9.74
WTR YR 1983 TOTAL 8125.6 MEAN 22.3 MAX 235 MIN 1.7 CFSM .64 IN 8.71

04148140 KEARSLEY CREEK NEAR DAVISON, MI

LOCATION.--Lat 43°02'01", long 83°34'53", in NE1/4 sec.12, T.7 N., R.7 E., Genesee County, Hydrologic Unit 04080204, on right bank 10 ft upstream from bridge on State Highway 21, 1.4 mi downstream from Black Creek, and 3.3 mi west of Davison.

DRAINAGE AREA.--99.4 mi^2.

PERIOD OF RECORD.--October 1965 to current year.

REVISED RECORDS.--WDR MI-78: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 747.39 ft National Geodetic Vertical Datum of 1929.

REMARKS.--Records good except those for the winter period, which are fair. Some diurnal fluctuation caused by small dams, and occasional diversion for sprinkler irrigation above station. Several observations of water temperature were made during the year. Gage-height telemark at station.

AVERAGE DISCHARGE.---18 years, 69.8 ft^3/s, 9.54 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,430 ft^3/s Apr. 21, 1975, gage height, 11.32 ft; minimum, 2.5 ft^3/s Sept. 10, 1978; minimum gage height, 2.69 ft Sept. 12, 1969.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 350 ft^3/s and maximum (*):

Date	Time	Discharge (ft³/s)	Gage height (ft)	Date	Time	Discharge (ft³/s)	Gage height (ft)
Apr. 14	2300	358	7.43	May 2	1300	*446	*8.19

Minimum discharge, 4.6 ft^3/s Sept. 12, 13, 14; gage height, 2.83 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	32	33	89	69	55	64	143	158	76	57	26	8.0
2	30	46	79	64	75	62	158	373	74	40	18	7.8
3	28	52	97	54	90	61	171	332	79	23	17	7.5
4	26	30	142	58	60	67	163	308	90	20	17	6.9
5	25	32	154	42	50	86	132	285	84	19	15	5.6
6	16	32	141	36	46	66	119	206	107	18	14	11
7	12	32	120	40	44	73	117	176	106	18	14	7.4
8	11	30	109	40	43	96	112	262	91	17	13	6.7
9	14	27	97	40	43	118	109	172	77	16	12	6.2
10	17	31	85	45	41	109	177	143	72	14	12	5.7
11	18	38	78	51	39	102	155	125	68	13	19	5.5
12	18	57	70	51	38	81	143	105	63	11	15	5.1
13	19	63	65	48	37	73	141	95	55	10	13	4.8
14	19	73	49	46	36	65	274	80	48	9.3	13	4.7
15	20	74	34	44	38	60	311	79	38	9.2	11	5.0
16	20	60	55	42	43	60	271	63	25	8.4	9.6	12
17	19	42	54	38	50	64	289	58	27	11	8.7	8.6
18	19	35	65	35	60	64	241	53	26	9.8	8.4	13
19	19	34	65	33	71	66	214	56	25	9.1	7.9	43
20	20	64	79	31	74	74	198	68	23	8.4	8.1	19
21	21	64	74	30	79	73	175	78	20	15	8.2	37
22	21	64	71	31	85	71	157	124	18	15	14	20
23	22	76	73	32	106	70	142	140	17	17	10	21
24	22	94	99	35	111	70	121	118	17	15	8.9	18
25	22	78	200	36	117	70	110	126	15	12	8.3	15
26	22	84	177	35	93	77	93	124	14	9.8	9.3	14
27	28	80	150	34	71	95	76	104	19	8.3	11	12
28	29	78	165	32	67	230	86	93	36	9.4	8.6	12
29	28	133	166	34	---	204	105	84	34	9.6	7.1	11
30	27	123	134	38	---	179	135	83	46	9.5	7.3	11
31	27	---	81	44	---	164	---	75	---	11	9.1	---
TOTAL	671	1759	3117	1288	1762	2814	4838	4346	1490	472.8	373.5	364.5
MEAN	21.6	58.6	101	41.5	62.9	90.8	161	140	49.7	15.3	12.0	12.2
MAX	32	133	200	69	117	230	311	373	107	57	26	43
MIN	11	27	34	30	36	60	76	53	14	8.3	7.1	4.7
CFSM	.22	.59	1.02	.42	.63	.91	1.62	1.41	.50	.15	.12	.12
IN.	.25	.66	1.17	.48	.66	1.05	1.81	1.63	.56	.18	.14	.14

CAL YR 1982 TOTAL 29415.3 MEAN 80.6 MAX 966 MIN 8.2 CFSM .81 IN 11.01
WTR YR 1983 TOTAL 23295.8 MEAN 63.8 MAX 373 MIN 4.7 CFSM .64 IN 8.72

04148160 GILKEY CREEK NEAR FLINT, MI

LOCATION.--Lat 43°01'27", long 83°37'32", in NE1/4 SW1/4 sec.10, T.7 N., R. 7 E., Genesee County, Hydrologic Unit 04080204, on right bank 25 ft downstream from culvert on extension of Arapaho Street, 5.1 mi upstream from mouth, and 3.5 mi east of Flint.

DRAINAGE AREA.--6.43 mi^2.

PERIOD OF RECORD.--January 1970 to current year.

REVISED RECORDS.--WDR MI-78: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 742.56 ft National Geodetic Vertical Datum of 1929. Prior to Mar. 17, 1983 at datum 5.00 ft higher.

REMARKS.--Records poor. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--13 years, 4.75 ft^3/s, 10.03 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 393 ft^3/s Oct. 1, 1981, gage height, 8.93 ft, datum then in use; no flow on many days during 1970, 1973-80.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 80 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
May 2	0500	*116	*8.58	June 30	1700	82	7.74

Minimum daily discharge, 0.01 ft^3/s Aug. 19, 20, 27, 28, Sept. 2-5, 9, 10.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.15	2.6	4.9	2.4	2.5	2.0	8.0	13	1.9	2.2	7.5	.04
2	.13	18	3.5	2.1	7.0	2.0	8.4	65	1.4	.77	1.6	.01
3	.12	12	13	1.7	18	2.0	12	15	4.2	.69	.47	.01
4	.11	1.7	28	1.4	8.0	2.0	9.2	9.0	6.1	.60	.22	.01
5	.11	1.1	34	1.3	2.5	2.0	6.7	6.1	3.5	.54	.14	.01
6	.10	.97	19	1.3	1.8	2.0	5.8	4.9	4.1	.35	.12	3.3
7	.10	.89	7.7	1.6	1.5	2.0	7.3	12	3.2	.27	.04	.22
8	.10	.85	4.5	1.2	1.4	3.5	5.9	43	1.9	.35	.29	.05
9	.09	.85	3.1	1.2	1.3	13	9.3	12	1.4	.19	.68	.01
10	.09	1.8	2.5	1.5	1.2	6.0	22	7.3	1.1	.19	.40	.01
11	.10	5.1	2.1	2.5	1.1	2.0	13	5.5	1.0	.16	5.5	.90
12	.09	10	1.6	2.0	1.0	1.5	8.7	4.4	.80	.12	1.3	.20
13	.09	4.3	1.3	1.7	1.0	1.5	11	3.5	.70	.09	.25	.04
14	.09	2.1	1.2	1.5	1.0	1.5	48	3.0	.55	.09	.10	.02
15	.09	1.8	1.5	1.4	1.0	1.5	20	2.7	.51	.10	.03	.02
16	.09	1.4	10	1.3	1.2	1.5	10	2.0	.44	.08	.02	2.5
17	.09	1.3	3.9	1.2	1.3	2.2	11	1.6	.32	.58	.02	.19
18	.09	1.2	4.9	1.1	1.5	3.6	12	1.5	.26	.38	.02	1.5
19	.08	1.1	4.1	1.0	1.8	5.6	11	4.0	.25	.15	.01	20
20	.15	18	8.2	1.0	2.2	4.6	9.9	2.9	.22	.13	.01	4.4
21	.11	6.1	4.3	1.0	2.7	3.8	6.6	1.8	.16	2.8	2.5	13
22	.08	3.0	2.8	1.0	3.5	3.8	5.0	5.8	.16	2.2	.70	.70
23	.08	7.2	5.3	1.2	10	3.8	4.0	5.5	.13	.49	.20	.09
24	.08	12	14	1.5	6.5	3.8	3.5	3.0	.07	.34	.06	.08
25	.08	3.9	44	1.2	4.5	3.8	2.9	5.8	.05	.08	.02	.07
26	.08	2.8	24	1.0	2.7	5.0	2.6	4.1	.13	.03	.02	.06
27	.08	2.1	10	.90	2.2	17	2.2	2.7	3.5	.02	.01	.05
28	.08	4.5	21	.80	2.0	48	11	2.2	5.7	1.1	.01	.04
29	.08	19	10	.90	---	21	8.2	3.2	1.1	.74	.02	.04
30	.09	9.4	4.4	1.5	---	13	15	2.3	9.1	.55	1.3	.03
31	.09	---	2.9	4.0	---	10	---	2.3	---	1.4	.20	---
TOTAL	2.99	157.06	301.7	45.40	92.4	195.0	310.2	257.1	53.95	17.78	23.76	47.60
MEAN	.096	5.24	9.73	1.46	3.30	6.29	10.3	8.29	1.80	.57	.77	1.59
MAX	.15	19	44	4.0	18	48	48	65	9.1	2.8	7.5	20
MIN	.08	.85	1.2	.80	1.0	1.5	2.2	1.5	.05	.02	.01	.01
CFSM	.02	.82	1.51	.23	.51	.98	1.60	1.29	.28	.09	.12	.25
IN.	.02	.91	1.75	.26	.53	1.13	1.79	1.49	.31	.10	.14	.28

CAL YR 1982 TOTAL 1746.63 MEAN 4.79 MAX 218 MIN .05 CFSM .75 IN 10.10
WTR YR 1983 TOTAL 1504.94 MEAN 4.12 MAX 65 MIN .01 CFSM .64 IN 8.71

04148300 SWARTZ CREEK AT FLINT, MI

LOCATION.--Lat 42°59'16", long 83°43'57", in NW1/4 sec.26. T.7 N., R.6 E., Genesee County, Hydrologic Unit 04080204, on right bank 6 ft downstream from bridge on South Ballenger Highway, in Flint, 3.6 mi upstream from mouth.

DRAINAGE AREA.--115 mi^2.

PERIOD OF RECORD.--January 1970 to current year.

REVISED RECORDS.--WDR MI-75: 1971-73.

GAGE.--Water-stage recorder. Datum of gage is 727.05 ft National Geodetic Vertical Datum of 1929. Prior to Sept. 4, 1970, nonrecording gage at same site and datum .

REMARKS.--Records good. Several observations of water temperature were made during the year. Gage-height telemark at station.

AVERAGE DISCHARGE.--13 years, 79.2 ft^3/s, 9.34 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,160 ft^3/s Apr. 19, 1975, gage height, 9.02 ft; minimum 0.01 ft^3/s Sept. 9. 1978; minimum gage height, 1.16 ft Aug. 19, 1971, Aug. 26, 1981.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 904 ft^3/s May 2, gage height, 6.84 ft, only peak above base of 800 ft^3/s; minimum, 0.36 ft^3/s Sept. 10, gage height, 1.28 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	7.6	33	60	69	33	64	179	247	70	73	31	4.6
2	7.3	87	51	62	98	61	174	751	64	43	9.8	3.2
3	7.3	53	127	59	134	58	244	443	74	33	6.6	2.6
4	7.3	22	178	55	73	57	208	267	93	28	5.0	2.4
5	7.3	14	189	48	60	57	156	198	86	25	3.9	1.7
6	7.1	12	144	43	45	57	139	172	84	21	4.4	21
7	7.1	11	89	44	39	72	153	211	82	19	4.1	5.4
8	6.4	10	71	39	36	115	143	635	71	17	3.2	3.3
9	6.1	13	60	37	33	124	163	303	63	14	2.6	2.6
10	7.3	20	53	43	30	97	387	188	65	13	5.6	1.2
11	6.6	34	48	48	28	84	260	150	55	12	28	6.8
12	6.1	52	45	44	26	74	189	127	48	9.8	12	2.1
13	5.6	39	42	43	25	69	188	109	43	8.6	6.8	1.8
14	5.6	26	36	39	27	67	555	96	39	7.8	4.6	1.5
15	5.0	21	39	40	30	64	515	87	36	5.9	2.9	1.8
16	5.2	19	72	43	35	62	289	77	32	6.6	2.6	17
17	4.8	18	56	39	40	60	244	70	29	6.4	2.3	4.6
18	4.8	17	49	28	47	66	251	63	26	7.1	2.0	20
19	4.6	17	56	25	55	86	247	84	23	5.6	1.7	93
20	10	88	82	24	76	85	265	82	22	5.6	1.2	29
21	5.6	61	73	23	76	78	218	70	20	50	5.6	43
22	4.8	43	59	25	83	81	178	83	18	25	24	17
23	4.6	56	76	38	118	84	154	106	16	13	6.1	9.8
24	5.2	70	148	35	102	83	137	91	14	8.6	3.5	5.6
25	6.6	49	275	31	85	81	123	98	13	6.4	2.4	4.4
26	5.0	39	206	25	73	83	111	95	14	4.6	2.1	5.2
27	5.4	34	129	22	67	141	101	85	57	5.0	1.8	4.8
28	6.1	47	173	20	66	552	198	78	118	16	1.4	4.8
29	7.1	93	133	22	---	467	224	83	85	9.5	1.1	4.4
30	6.6	80	93	59	---	289	223	79	113	7.3	8.1	3.5
31	8.6	---	76	53	---	215	---	76	---	9.2	6.4	---
TOTAL	194.7	1178	2988	1225	1640	3633	6616	5304	1573	516.0	202.8	328.1
MEAN	6.28	39.3	96.4	39.5	58.6	117	221	171	52.4	16.6	6.54	10.9
MAX	10	93	275	69	134	552	555	751	118	73	31	93
MIN	4.6	10	36	20	25	57	101	63	13	4.6	1.1	1.2
CFSM	.06	.34	.84	.34	.51	1.02	1.92	1.49	.46	.14	.06	.10
IN.	.06	.38	.97	.40	.53	1.18	2.14	1.72	.51	.17	.07	.11

CAL YR 1982 TOTAL 29097.3 MEAN 79.7 MAX 1850 MIN 2.7 CFSM .69 IN 9.41
WTR YR 1983 TOTAL 25398.6 MEAN 69.6 MAX 751 MIN 1.1 CFSM .61 IN 8.22

04148440 THREAD CREEK NEAR FLINT, MI

LOCATION.--Lat 42°58'30", long 83°38'09", in SE1/4 SE1/4 sec.28, T.7 N., R.7 E., Genesee County, Hydrologic Unit 04080204, on left bank 20 ft downstream from bridge on Bristol Road, 6.0 mi upstream from mouth, and 4.0 mi southeast of Flint.

DRAINAGE AREA.--54.4 mi^2.

PERIOD OF RECORD.--January 1970 to current year.

REVISED RECORDS.--WDR MI-78: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 764.36 ft National Geodetic Vertical Datum of 1929. Prior to May 13, 1970, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, those for the period of no gage-height record, Nov. 23 to Jan. 3, and those below 10 ft^3/s, which are fair. Several observations of water temperature were made during the year. Gage-height telemark at station.

AVERAGE DISCHARGE.--13 years, 36.7 ft^3/s, 9.16 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,260 ft^3/s Apr. 19, 1975, gage height, 7.65 ft, from high water marks; no flow Aug. 7, 8, 10, 1971.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 202 ft^3/s May 2, gage height, 4.97 ft, no peak above base of 300 ft^3/s; minimum daily, 1.3 ft^3/s Sept. 15; minimum gage height, 0.70 ft July 21.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	6.6	26	40	28	21	32	88	82	33	26	11	3.2
2	5.7	32	35	24	41	30	78	175	29	18	7.7	2.7
3	5.0	37	45	21	47	29	83	172	31	14	5.3	2.2
4	4.6	21	60	19	36	29	78	156	46	11	5.1	1.9
5	4.1	19	70	18	31	30	74	123	45	9.2	5.0	1.4
6	4.0	15	60	14	25	34	67	100	53	7.5	6.4	6.7
7	4.5	13	40	13	23	40	66	88	50	6.6	6.0	3.3
8	5.2	11	33	12	18	64	61	118	46	5.8	4.5	2.0
9	4.9	11	29	11	17	65	66	82	39	4.9	3.9	1.7
10	5.2	17	27	14	14	57	96	70	37	4.8	3.1	1.6
11	5.2	24	25	18	12	48	92	60	27	4.2	7.6	3.7
12	5.6	41	22	25	15	41	88	49	20	3.5	6.8	2.3
13	5.7	33	20	26	14	36	89	41	15	3.3	4.6	1.8
14	5.8	25	18	19	15	35	144	35	12	3.1	3.8	1.5
15	6.6	22	18	21	20	33	147	31	10	2.9	3.8	1.3
16	6.5	19	34	16	21	29	146	27	9.0	2.8	3.3	7.0
17	6.4	16	27	13	30	27	131	22	7.9	3.7	2.8	5.4
18	7.8	14	24	11	33	30	121	19	6.6	8.6	3.1	4.9
19	7.4	12	26	9.5	35	38	113	23	5.4	5.5	7.3	15
20	8.5	36	38	8.8	36	38	114	31	4.7	4.1	9.4	6.3
21	11	35	34	8.9	29	35	106	37	4.0	9.1	8.5	23
22	9.6	33	29	9.4	31	33	96	54	3.5	17	18	7.3
23	11	30	35	16	47	32	83	64	3.3	6.5	10	5.7
24	13	40	60	17	49	32	71	57	3.7	5.5	8.4	4.9
25	12	35	100	16	50	32	63	63	3.4	4.9	8.0	4.2
26	13	33	80	13	57	38	52	56	2.9	4.4	7.0	4.4
27	13	32	50	12	38	62	44	49	19	3.6	6.2	3.5
28	12	35	70	12	35	143	55	44	44	4.3	6.0	2.9
29	13	58	55	12	---	134	58	41	31	4.7	4.1	2.6
30	15	50	43	23	---	126	70	37	28	5.6	2.3	2.3
31	15	---	35	21	---	106	---	35	---	4.8	5.3	---
TOTAL	252.9	825	1282	501.6	840	1538	2640	2041	669.4	219.9	194.3	136.7
MEAN	8.16	27.5	41.4	16.2	30.0	49.6	88.0	65.8	22.3	7.09	6.27	4.56
MAX	15	58	100	28	57	143	147	175	53	26	18	23
MIN	4.0	11	18	8.8	12	27	44	19	2.9	2.8	2.3	1.3
CFSM	.15	.51	.76	.30	.55	.91	1.62	1.21	.41	.13	.12	.08
IN.	.17	.56	.88	.34	.57	1.05	1.81	1.40	.46	.15	.13	.09

CAL YR 1982 TOTAL 14690.05 MEAN 40.2 MAX 890 MIN .95 CFSM .74 IN 10.05
WTR YR 1983 TOTAL 11140.80 MEAN 30.5 MAX 175 MIN 1.3 CFSM .56 IN 7.62

04148500 FLINT RIVER NEAR FLINT, MI

LOCATION.--Lat 43°02'20", long 83°46'10", in SW1/4 sec.4, T.7 N., R.6 E., Genesee County, Hydrologic Unit 04080204, on left bank on grounds of sewage-treatment plant, 1.2 mi upstream from Pirnie Creek, and 5.0 mi downstream from Swartz Creek.

DRAINAGE AREA.--956 mi^2.

PERIOD OF RECORD.--September 1903 to March 1904 (gage heights only), August 1932 to current year. Gage-height records for flood seasons collected in this vicinity 1911-32, are contained in reports of U.S. Weather Bureau.

REVISED RECORDS.--WSP 954: 1941. WSP 1337: 1933-34(M), 1935-37. WDR MI-78: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 678.80 ft National Geodetic Vertical Datum of 1929 (levels by U.S. Weather Bureau and city of Flint).

REMARKS.--Records good. Some regulation by reservoirs above station (station 04147000). Occasional diversion for industrial use. Since Dec. 17, 1967, flow contains up to 50 ft^3/s as sewage effluent which originates outside the basin. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--51 years, 588 ft^3/s, 8.35 in/yr, adjusted for storage since 1954.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 14,900 ft^3/s Apr. 6, 1947, gage height, 16.35 ft; minimum, 9.0 ft^3/s Aug. 7, 1934.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 4,080 ft^3/s May 2, gage height, 9.53 ft; minimum, 96 ft^3/s Oct. 19, gage height, 2.86 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	266	396	860	943	452	787	1500	1380	756	521	388	151
2	548	691	801	867	684	746	1510	3500	730	365	258	148
3	741	700	1140	752	879	707	1590	3000	759	326	229	141
4	853	461	1380	659	705	685	1500	2760	823	282	237	134
5	816	421	1480	597	639	682	1330	2550	784	276	222	129
6	812	414	1350	573	596	701	1270	2470	839	250	206	280
7	803	407	1180	579	587	762	1260	1670	834	234	193	174
8	781	381	1100	528	552	990	1160	2650	807	222	186	153
9	407	376	1000	489	501	1060	1250	1970	735	213	198	144
10	267	449	919	520	454	1020	1800	1560	725	196	184	143
11	205	520	852	553	403	950	1510	1290	650	182	376	152
12	187	645	736	572	373	859	1030	1230	592	143	248	145
13	186	629	649	545	355	788	1030	1110	515	171	192	144
14	180	548	591	558	359	739	1950	868	434	171	171	142
15	186	524	562	550	416	698	2240	837	399	168	184	138
16	176	512	719	471	433	652	1880	769	373	163	195	253
17	168	481	655	431	541	620	2160	706	344	153	186	173
18	185	453	649	394	597	646	2370	633	316	168	186	236
19	167	420	684	383	650	700	2240	648	286	173	170	616
20	208	804	772	362	746	710	2130	633	279	160	162	249
21	187	715	780	338	807	768	1800	636	276	350	157	450
22	191	663	755	337	879	732	1880	850	256	282	295	228
23	202	782	800	410	1030	764	1710	979	240	200	176	200
24	233	873	1000	394	1060	771	1410	946	234	178	159	177
25	219	810	1560	378	1040	761	1460	1030	225	168	154	165
26	218	781	1660	366	951	753	589	988	210	163	152	166
27	205	733	1410	356	890	918	483	917	362	157	151	168
28	207	761	1360	326	836	2060	886	816	630	204	142	167
29	204	924	1380	332	---	2010	886	833	434	198	144	160
30	200	974	1270	469	---	1660	881	798	552	185	167	159
31	206	---	1100	514	---	1560	---	807	---	173	189	---
TOTAL	10414	18248	31154	15546	18415	28259	44695	41834	15399	6795	6257	5885
MEAN	336	608	1005	501	658	912	1490	1349	513	219	202	196
MAX	853	974	1660	943	1060	2060	2370	3500	839	521	388	616
MIN	167	376	562	326	355	620	483	633	210	143	142	129
MEAN +	224	623	1013	479	667	915	1600	1360	498	217	195	197
CFSM +	.23	.65	1.06	.50	.70	.96	1.67	1.42	.52	.23	.20	.21
IN +	.27	.73	1.22	.58	.73	1.10	1.87	1.64	.58	.26	.24	.23

CAL YR 1982 TOTAL 287622 MEAN 788 MAX 6740 MIN 137 MEAN + 789 CFSM + .83 IN + 11.21
WTR YR 1983 TOTAL 242901 MEAN 665 MAX 3500 MIN 129 MEAN + 665 CFSM + .70 IN + 9.44

+ Adjusted for change in contents in Holloway Reservoir.

04148720 BRENT RUN NEAR MONTROSE, MI

LOCATION.--Lat 43°10'12", long 83°50'03", in SE1/4 NE1/4 sec.23, T.9 N., R.5 E., Genesee County, Hydrologic Unit 04080204, on right bank 10 ft downstream from bridge on Morrish Road, 0.8 mi upstream from Central-Stadler Drain , 3.0 mi upstream from mouth, and 3.1 mi east of Montrose.

DRAINAGE AREA.--20.8 mi^2.

PERIOD OF RECORD.--January 1970 to current year.

REVISED RECORDS.--WDR MI-78: Drainage area.

GAGE.--Water-stage recorder. Altitude of gage is 655 ft from topographic map (nearest 5 ft). Prior to Aug. 26, 1970, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are poor. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--13 years, 15.0 ft^3/s, 9.79 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 735 ft^3/s Oct. 1, 1981; maximum gage height, 7.20 ft Mar. 13, 1982, backwater from ice; minimum discharge, 1.9 ft^3/s Oct. 13, 1978; minimum gage height, 1.01 ft Aug. 9, 17, 1971.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 402 ft^3/s May 2, gage height, 4.99 ft, only peak above base of 250 ft^3/s; minimum, 2.5 ft^3/s Sept. 5, 6, gage height, 1.04 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4.8	16	20	12	15	13	37	105	13	17	11	6.5
2	4.6	67	15	11	20	12	27	215	9.6	12	18	3.9
3	4.1	123	47	11	60	11	49	126	9.4	8.8	8.4	3.4
4	3.4	52	120	11	20	11	41	42	24	9.1	5.9	2.8
5	3.3	17	73	11	15	11	21	25	14	9.4	5.5	2.6
6	3.5	13	70	10	11	12	16	18	10	7.6	5.2	4.1
7	3.8	10	26	10	9.0	14	17	19	11	7.0	4.5	17
8	4.4	9.0	16	11	8.4	27	21	82	8.3	6.5	4.2	6.2
9	4.3	7.9	12	9.0	7.5	41	16	56	7.7	6.1	3.8	4.2
10	4.2	12	10	10	7.0	17	76	22	7.6	6.0	4.4	3.8
11	4.4	22	10	17	6.5	11	50	17	7.1	5.5	11	3.6
12	4.5	61	9.5	12	6.0	9.2	27	14	6.5	5.0	28	3.6
13	5.1	54	9.1	10	6.0	8.0	20	12	5.7	5.0	11	3.9
14	5.3	17	8.6	9.0	6.0	8.6	75	11	5.0	4.8	7.8	3.3
15	5.4	11	8.6	8.5	6.5	8.6	128	10	5.0	4.8	5.3	3.2
16	5.3	8.9	26	8.0	7.0	8.1	33	9.5	5.0	4.8	4.4	4.7
17	7.1	8.0	19	7.0	8.0	7.6	23	8.5	4.8	4.9	4.4	14
18	5.6	7.3	13	6.5	9.5	8.5	40	8.5	4.6	4.9	4.4	9.7
19	5.6	7.0	11	6.0	11	14	34	11	4.7	4.5	4.3	26
20	4.9	33	26	6.0	15	18	29	32	4.6	4.9	4.2	17
21	11	83	19	5.5	19	13	21	15	4.2	4.6	3.8	17
22	7.2	22	13	6.0	21	13	15	14	4.2	13	11	16
23	4.8	17	12	7.0	33	12	12	36	4.3	8.9	12	7.7
24	4.7	40	36	8.5	26	12	12	16	4.1	9.0	5.6	5.9
25	4.7	20	77	7.0	18	13	11	14	4.4	7.1	4.4	5.8
26	4.6	12	118	6.0	14	15	9.3	25	4.1	4.8	4.1	5.0
27	4.6	11	29	5.0	12	17	9.1	13	4.6	4.3	3.9	4.4
28	4.7	9.9	35	4.5	12	85	13	11	37	5.1	3.7	4.0
29	5.2	42	39	5.0	---	126	64	10	27	9.0	3.5	3.9
30	6.2	52	18	7.0	---	51	35	15	11	12	3.1	3.9
31	7.8	---	14	25	---	35	---	13	---	9.9	5.2	---
TOTAL	159.1	865.0	959.8	282.5	409.4	662.6	981.4	1025.5	272.5	226.3	216.0	217.1
MEAN	5.13	28.8	31.0	9.11	14.6	21.4	32.7	33.1	9.08	7.30	6.97	7.24
MAX	11	123	120	25	60	126	128	215	37	17	28	26
MIN	3.3	7.0	8.6	4.5	6.0	7.6	9.1	8.5	4.1	4.3	3.1	2.6
CFSM	.25	1.39	1.49	.44	.70	1.03	1.57	1.59	.44	.35	.34	.35
IN.	.28	1.55	1.72	.51	.73	1.18	1.76	1.83	.49	.40	.39	.39

CAL YR 1982 TOTAL 6494.2 MEAN 17.8 MAX 450 MIN 2.4 CFSM .86 IN 11.61
WTR YR 1983 TOTAL 6277.2 MEAN 17.2 MAX 215 MIN 2.6 CFSM .83 IN 11.23

04149000 FLINT RIVER NEAR FOSTERS, MI

LOCATION.--Lat 43°18'30", long 83°57'13", in SE1/4 SE1/4 sec.35, T.11 N., R.4 E., Saginaw County, Hydrologic Unit 04080204, on left bank 20 ft downstream from bridge on State Highway 13, 2 mi west of Fosters and 6.5 mi downstream from Silver Creek. Records include flow of Birch Run.

DRAINAGE AREA.--1,188 mi^2, includes that of Birch Run above State Highway 13.

PERIOD OF RECORD.--October 1939 to current year. Monthly discharge only for some periods, published in WSP 1307. Gage-height records for flood seasons collected in this vicinity 1910-20, 1922-27 are contained in reports of U.S. Weather Bureau.

REVISED RECORDS.--WSP 954: 1941. WSP 1337: 1940, 1942, 1943-44(M), 1945, 1946-47(M), 1948-50, WDR MI-78: Drainage area.

GAGE.--Water-stage recorder. Altitude of gage is 600 ft, from topographic map. Prior to Oct. 1, 1969, nonrecording gage at site 2.2 mi upstream at datum 582.22 ft National Geodetic Vertical Datum of 1929.

REMARKS.--Records good except those for the winter period and those for periods of indefinite stage-discharge relation, Oct. 1-5, Oct. 11 to Nov. 18, which are poor. Some regulation by reservoirs above Flint. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--44 years, 741 ft^3/s, 8.47 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 19,000 ft^3/s Apr. 7, 1947 (including flow by-passing gage); maximum gage height, 18.6 ft Feb. 2, 1968, site and datum then in use; minimum discharge observed, 27 ft^3/s Aug. 6, 1941.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of March 1904, reached a stage of 18.4 ft from U.S. Weather Bureau data, site and datum then in use.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 5,360 ft^3/s May 3, gage height, 14.68 ft; minimum, 163 ft^3/s Sept. 6, gage height, 1.90 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	350	290	1170	1170	560	948	1970	1770	947	736	306	230
2	340	500	1050	1060	800	898	1830	3430	891	530	431	194
3	620	940	1400	965	1000	855	2100	5110	833	435	324	189
4	820	800	2070	860	850	820	2120	3580	1010	385	294	180
5	920	580	2130	791	750	800	1790	3010	997	379	299	172
6	868	520	1970	733	700	800	1550	2600	938	355	282	185
7	874	520	1490	723	680	840	1490	2330	974	318	266	334
8	855	500	1260	717	660	1060	1500	2680	936	298	249	230
9	755	480	1130	658	600	1400	1350	3120	878	294	246	200
10	424	470	1010	638	550	1280	2100	2160	823	277	246	194
11	320	560	938	703	500	1160	2310	1800	797	263	294	194
12	250	750	825	746	450	1030	1730	1630	712	248	498	200
13	230	900	726	723	420	928	1350	1380	648	195	321	198
14	230	840	658	701	412	859	1900	1210	562	218	251	196
15	230	700	630	726	473	810	3200	1040	491	224	230	191
16	230	630	832	669	546	764	2580	953	460	220	237	202
17	220	580	817	600	621	719	2230	882	431	215	246	306
18	210	560	743	540	712	707	2560	813	405	210	242	254
19	230	488	766	500	717	792	2660	734	378	219	239	482
20	210	686	937	480	836	896	2520	947	349	240	225	512
21	260	1240	951	450	926	989	2250	843	343	232	213	407
22	230	955	875	420	982	873	1940	843	333	470	249	442
23	240	847	911	420	1200	859	1900	1250	314	337	339	292
24	260	1100	1320	500	1290	888	1680	1190	301	278	234	263
25	290	1060	2190	490	1200	897	1580	1110	294	249	213	242
26	270	937	2330	470	1120	889	1260	1270	279	234	207	230
27	270	885	1780	440	1040	925	720	1140	318	222	207	232
28	260	826	1730	430	983	1900	665	1020	679	218	207	230
29	260	1020	1730	410	---	3200	1400	934	795	275	198	227
30	250	1370	1540	450	---	2470	1120	961	513	280	196	220
31	250	---	1350	600	---	2010	---	951	---	319	216	---
TOTAL	12026	22534	39259	19783	21578	34266	55355	52691	18629	9373	8205	7628
MEAN	388	751	1266	638	771	1105	1845	1700	621	302	265	254
MAX	920	1370	2330	1170	1290	3200	3200	5110	1010	736	498	512
MIN	210	290	630	410	412	707	665	734	279	195	196	172

CAL YR 1982 TOTAL 352745 MEAN 966 MAX 8500 MIN 197
WTR YR 1983 TOTAL 301327 MEAN 826 MAX 5110 MIN 172

04149500 FLINT RIVER NEAR ALICIA, MI

LOCATION.--Lat 43°18'40", long 84°02'00", in SE1/4 sec.31, T.11 N., R.4 E., Saginaw County, Hydrologic Unit 04080204, on left bank 100 ft downstream from the Prairie Farms Association flood-pumping station, 2.8 mi north of Alicia, and 4 mi upstream from mouth.

PERIOD OF RECORD.--November 1948 to current year (gage heights only).

GAGE.--Water-stage recorder. Datum of gage is 577.00 ft National Geodetic Vertical Datum of 1929.

REMARKS.--Records good. Records represent stages in the Shiawassee Flats area.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height, 13.70 ft Apr. 3, 1960; minimum, less than 1.5 ft during many days in 1949, 1958, 1959, 1963, 1964, 1966-69.

EXTREMES FOR CURRENT YEAR.--Maximum gage height, 9.56 ft May 3; minimum, 1.56 ft Oct. 20, 21.

GAGE HEIGHT (FEET ABOVE DATUM), WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3.55	3.49	4.52	4.61	4.26	4.22	7.14	5.80	5.58	4.81	4.56	4.55
2	3.65	3.39	4.34	4.55	4.12	4.16	7.29	7.63	5.49	4.97	4.82	4.37
3	3.26	3.63	4.67	4.30	4.50	4.22	7.74	9.34	5.32	4.54	4.44	4.36
4	3.69	3.53	6.26	4.10	4.65	4.20	7.92	9.11	5.45	4.39	4.82	4.20
5	3.49	2.70	6.84	3.83	4.48	4.32	7.79	8.38	5.45	5.06	4.89	4.07
6	3.49	2.82	7.18	3.88	4.13	4.18	7.41	7.65	5.50	4.98	4.64	4.03
7	3.23	3.12	6.90	3.52	3.97	3.99	6.78	7.12	5.39	4.63	4.70	4.49
8	3.55	3.32	6.51	4.28	3.95	4.71	6.41	7.89	5.44	4.49	4.35	4.49
9	3.93	3.67	5.95	3.81	3.96	5.43	6.30	8.37	4.92	5.06	5.06	3.91
10	3.16	3.39	4.98	3.58	3.78	5.88	6.59	8.17	5.24	4.72	4.60	4.10
11	3.03	3.22	4.90	3.62	3.75	5.88	7.13	7.57	5.04	4.43	5.26	4.32
12	2.95	3.34	4.50	4.60	3.65	5.39	7.19	6.78	4.80	4.65	5.06	4.67
13	3.20	4.25	3.87	3.82	3.48	4.87	6.76	6.12	4.77	4.75	4.59	4.80
14	2.82	3.86	3.89	4.25	3.59	4.55	6.84	5.62	4.76	4.55	4.37	4.47
15	3.41	3.52	4.29	4.84	3.76	4.43	8.02	5.50	4.63	4.61	4.44	4.34
16	3.67	3.12	4.45	4.03	3.91	4.35	8.56	5.47	4.65	4.67	4.32	4.15
17	3.40	3.47	4.35	3.85	4.00	4.39	8.61	5.00	4.83	4.72	4.35	4.15
18	2.79	3.49	3.63	3.88	4.25	4.45	8.19	4.68	4.92	4.78	4.61	3.89
19	3.04	3.44	3.69	3.85	4.30	4.34	7.65	4.68	4.96	4.73	4.29	4.37
20	2.32	3.37	4.02	3.74	4.36	4.73	7.20	4.89	4.89	4.79	4.60	4.24
21	3.09	4.19	4.40	3.75	4.50	6.81	6.74	5.36	4.80	4.72	4.61	4.49
22	3.41	4.35	4.21	3.71	4.64	5.38	6.31	5.35	4.66	4.88	4.52	4.11
23	3.22	4.12	4.13	3.57	4.87	4.69	6.05	5.43	4.62	4.51	4.81	4.40
24	3.19	4.41	4.50	3.67	5.18	4.67	5.87	5.74	4.83	4.90	4.59	4.17
25	3.23	3.98	5.88	3.81	5.18	4.66	5.44	5.67	4.87	4.77	4.46	3.84
26	3.24	3.84	7.27	3.93	4.72	4.54	5.05	5.82	4.38	4.68	4.46	4.09
27	3.20	4.08	7.14	3.73	4.27	4.57	4.41	5.77	5.18	4.49	4.49	4.43
28	3.03	3.77	6.57	3.63	4.13	5.47	4.65	5.46	5.78	4.18	4.59	4.31
29	2.66	3.70	6.14	3.63	---	7.24	4.84	5.15	5.41	4.50	4.48	4.26
30	2.90	4.60	5.79	3.68	---	7.49	5.12	5.12	4.87	4.75	4.43	4.28
31	3.31	---	5.21	4.12	---	7.16	---	5.37	---	4.50	4.84	---
MEAN	3.23	3.64	5.19	3.94	4.23	5.01	6.73	6.32	5.05	4.68	4.61	4.28
MAX	3.93	4.60	7.27	4.84	5.18	7.49	8.61	9.34	5.78	5.06	5.26	4.80
MIN	2.32	2.70	3.63	3.52	3.48	3.99	4.41	4.68	4.38	4.18	4.29	3.84

04150500 CASS RIVER AT CASS CITY, MI

LOCATION.--Lat 43°35'03", long 83°10'34", in NE1/4 NE1/4 sec.4, T.13 N., R.11 E., Tuscola County, Hydrologic Unit 04080205, on left bank 600 ft downstream from bridge on Cemetery Road, 0.3 mi downstream from confluence of North and South Branches, and 1.1 mi south of Cass City.

DRAINAGE AREA.--359 mi^2.

PERIOD OF RECORD.--October 1947 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1337: 1949-50. WSP 1727: 1948(M), 1950. WDR MI-78: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 697.92 ft National Geodetic Vertical Datum of 1929. Prior to Nov. 14, 1952, nonrecording gage at site 600 ft upstream at present datum.

REMARKS.--Records good except those for the winter period, which are poor. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--36 years, 204 ft^3/s, 7.72 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 8,460 ft^3/s Mar. 20, 1948, gage height, 15.80 ft, from graph based on gage readings; minimum, 0.50 ft^3/s Sept. 26, 1948.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 1,400 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Dec. 26	0700	1,470	8.42	Apr. 15	0800	*2,980	*10.53
Mar. 29	1000	1,540	8.85	May 3	0300	2,320	9.68

Minimum discharge, 9.5 ft^3/s Sept. 13, 14, gage height, 4.59 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	23	20	289	170	240	300	829	335	209	117	35	20
2	21	69	260	155	210	306	726	1220	200	87	37	20
3	20	174	372	145	600	309	755	1840	185	67	24	18
4	17	187	617	135	500	319	936	1010	188	54	20	16
5	18	167	652	135	320	331	669	791	211	49	34	14
6	17	139	890	135	200	322	525	578	218	45	40	15
7	17	105	705	135	150	321	486	466	191	39	24	14
8	15	84	498	135	130	342	518	954	159	35	17	14
9	14	71	379	135	125	400	418	903	135	33	13	15
10	14	64	280	133	120	368	964	724	125	31	12	14
11	14	64	210	160	120	304	992	535	115	30	199	12
12	13	94	170	157	115	252	791	382	103	29	1040	11
13	13	158	155	155	115	222	649	292	92	27	665	10
14	13	154	150	155	125	201	1390	242	86	26	300	9.6
15	13	134	150	145	148	190	2690	212	74	25	148	11
16	12	117	160	120	234	172	1430	183	66	24	85	15
17	13	99	175	115	330	159	912	161	59	21	54	19
18	12	88	195	115	430	151	706	144	52	19	39	38
19	11	80	216	110	390	178	583	145	46	18	34	65
20	12	96	266	105	450	253	516	184	43	17	29	66
21	13	195	329	98	560	238	446	187	39	17	24	71
22	14	218	312	94	640	186	357	191	36	18	25	84
23	14	208	282	94	730	234	292	256	34	16	30	91
24	16	281	408	100	787	222	249	249	31	17	32	68
25	15	291	1010	105	565	216	216	243	29	16	27	52
26	14	215	1380	105	465	227	195	263	27	14	26	41
27	13	178	895	105	388	268	176	235	29	13	24	35
28	13	163	705	100	310	762	171	205	74	12	22	31
29	13	164	669	96	---	1410	186	183	205	15	19	26
30	13	284	410	100	---	963	202	176	175	28	18	24
31	14	---	230	215	---	817	---	187	---	45	20	---
TOTAL	454	4361	13419	3962	9497	10943	19975	13676	3236	1004	3116	939.6
MEAN	14.6	145	433	128	339	353	666	441	108	32.4	101	31.3
MAX	23	291	1380	215	787	1410	2690	1840	218	117	1040	91
MIN	11	20	150	94	115	151	171	144	27	12	12	9.6
CFSM	.04	.40	1.21	.36	.94	.98	1.86	1.23	.30	.09	.28	.09
IN.	.05	.45	1.39	.41	.98	1.13	2.07	1.42	.34	.10	.32	.10

CAL YR 1982 TOTAL 99162.3 MEAN 272 MAX 4150 MIN 9.0 CFSM .76 IN 10.28
WTR YR 1983 TOTAL 84582.6 MEAN 232 MAX 2690 MIN 9.6 CFSM .65 IN 8.76

04150800 CASS RIVER AT WAHJAMEGA, MI

LOCATION.--Lat 43°27'02", long 83°26'29", in NW1/4 NW1/4 sec.20, T.12 N., R.9 E., Tuscola County, Hydrologic Unit 04080205, on right bank 90 ft upstream from bridge on Chambers Road, on grounds of Caro Regional Center at Wahjamega, 1.9 mi downstream from Michigan Sugar Co. dam, and 40 mi upstream from mouth.

DRAINAGE AREA.--645 mi^2.

PERIOD OF RECORD.--October 1968 to current year.

REVISED RECORDS.--WDR MI-78: Drainage area.

GAGE.--Water-stage recorder. Altitude of gage is 650 ft from topographic map. Prior to June 19, 1969, nonrecording gage at bridge 90 ft downstream at present datum.

REMARKS.--Records good except those for the winter period, which are poor. Some regulation by dam at Michigan Sugar Co., 1.9 mi above station. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--15 years, 409 ft^3/s, 8.61 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 11,700 ft^3/s Mar. 6, 1976, gage height, 19.92 ft; minimum, 20 ft^3/s Oct. 2, 3, 1979.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 2,400 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Mar. 29	1800	2,550	9.96	May 3	1200	3,580	11.80
Apr. 15	1800	*4,280	*12.99				

Minimum discharge, 44 ft^3/s Oct. 18; minimum gage height, 2.96 ft July 27-29.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	89	69	537	480	371	528	1550	642	466	251	121	75
2	78	151	480	429	342	527	1520	1720	441	196	111	72
3	74	305	555	336	765	531	1440	3340	399	167	99	70
4	70	401	972	256	1060	533	1750	2050	425	145	94	64
5	64	333	1070	301	570	554	1380	1400	493	132	91	60
6	63	278	1240	273	350	558	1020	1060	514	119	104	70
7	62	231	1170	263	280	560	900	863	446	108	106	69
8	61	192	815	249	230	641	996	1710	367	99	84	62
9	57	166	626	245	220	746	839	1960	312	90	72	60
10	55	154	478	249	215	726	1280	1320	286	81	62	59
11	56	160	418	293	210	591	1860	1010	265	77	146	58
12	56	215	275	305	205	490	1390	762	235	74	1120	56
13	53	304	286	264	200	421	1170	596	207	67	1400	54
14	53	336	276	310	200	383	1730	497	186	61	686	53
15	56	288	273	260	193	358	3900	434	171	59	365	52
16	53	251	305	200	245	332	3060	380	155	58	242	57
17	51	220	348	200	499	306	1690	334	142	56	177	71
18	51	196	362	195	799	302	1320	303	131	56	129	109
19	51	180	385	195	698	343	1100	305	120	54	122	118
20	54	208	436	190	752	484	930	400	114	52	108	156
21	56	306	548	165	1040	514	820	416	107	52	96	168
22	53	421	542	166	1060	385	685	398	100	53	77	164
23	53	401	483	161	1330	375	575	534	92	52	96	132
24	54	415	524	169	1480	422	498	554	87	52	102	151
25	55	527	1250	190	1060	405	441	503	82	52	94	134
26	55	439	2080	190	737	416	389	571	75	50	60	116
27	54	342	1580	180	676	480	355	531	90	49	75	86
28	53	285	1120	170	564	965	354	448	213	48	78	83
29	53	308	1070	166	---	2360	430	394	318	52	72	82
30	54	425	822	174	---	2050	448	380	334	68	70	74
31	58	---	532	241	---	1480	---	425	---	113	78	---
TOTAL	1805	8507	21858	7465	16351	19766	35820	26240	7373	2643	6337	2635
MEAN	58.2	284	705	241	584	638	1194	846	246	85.3	204	87.8
MAX	89	527	2080	480	1480	2360	3900	3340	514	251	1400	168
MIN	51	69	273	161	193	302	354	303	75	48	60	52
CFSM	.09	.44	1.09	.37	.91	.99	1.85	1.31	.38	.13	.32	.14
IN.	.10	.49	1.26	.43	.94	1.14	2.07	1.51	.43	.15	.37	.15

CAL YR 1982 TOTAL 176191 MEAN 483 MAX 6720 MIN 33 CFSM .75 IN 10.16
WTR YR 1983 TOTAL 156800 MEAN 430 MAX 3900 MIN 48 CFSM .67 IN 9.04

04151500 CASS RIVER AT FRANKENMUTH, MI

LOCATION.--Lat 43°19'40", long 83°44'53", in NW1/4 SE1/4 sec.27, T.11 N., R.6 E., Saginaw County, Hydrologic Unit 04080205, on right bank 2,000 ft below dam in Frankenmuth, 3,600 ft above highway bridge on Dehmel Road, 3.4 mi upstream from Dead Creek, and 17 mi upstream from mouth.

DRAINAGE AREA.--841 mi².

PERIOD OF RECORD.--February 1908 to March 1909, July 1935 to September 1936, June 1939 to current year.

REVISED RECORDS.--WSP 1307: 1936(M), 1940(M). WSP 1727: 1952. WSP 1911: 1952. WDR MI-78: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 583.96 ft National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). February 1908 to March 1909, nonrecording gage at site 2,000 ft upstream at datum 1.81 ft lower, July 18 to September 11, 1935, nonrecording gage, Sept. 12, 1935, to Sept. 30, 1936, June 20, 1939, to Sept. 30, 1949, water-stage recorder, at site 3,600 ft downstream at datum 0.04 ft higher.

REMARKS.--Records good except those for the winter period, which are poor. Occasional regulation by dams above station. Prior to 1950, regulation at low and medium flows by mill above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--45 years, 485 ft³/s, 7.83 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 17,700 ft³/s Mar. 18, 1942, gage height, 20.88 ft, site and datum then in use; maximum gage height, 23.37 ft Feb. 3, 1968, backwater from ice; minimum daily discharge, about 1.5 ft³/s Aug. 6, 1944.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 3,500 ft³/s and maximum (*):

Date	Time	Discharge (ft³/s)	Gage height (ft)	Date	Time	Discharge (ft³/s)	Gage height (ft)
Apr. 16	0300	*5,180	*15.80	May 3	2000	4,500	15.01

Minimum discharge, 58 ft³/s July 28, gage height, 3.48 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	118	100	655	625	413	700	1930	921	635	409	165	96
2	109	204	637	568	505	700	1960	2370	606	313	167	91
3	99	366	756	463	684	700	1910	4220	552	249	148	85
4	93	514	1140	357	1180	710	2130	3420	612	214	146	80
5	91	461	1420	405	900	720	1920	2040	655	193	138	72
6	87	389	1490	414	450	740	1410	1500	677	172	127	82
7	82	333	1500	391	380	740	1190	1190	619	156	136	88
8	79	284	1120	372	300	800	1220	1990	527	143	127	81
9	78	249	838	347	290	980	1150	2840	454	129	103	73
10	74	226	658	358	280	960	1420	1940	420	115	90	69
11	72	232	567	415	270	800	2270	1430	390	103	173	67
12	73	341	408	449	270	671	1980	1090	350	103	614	63
13	74	442	352	396	260	580	1600	850	308	97	1420	64
14	73	457	389	424	260	533	2100	703	273	90	970	64
15	76	419	408	425	270	493	4270	616	247	86	541	59
16	76	364	440	270	335	466	4590	545	225	82	360	71
17	73	322	468	260	507	428	2600	487	204	75	263	82
18	71	289	491	250	825	418	1910	446	189	75	211	122
19	78	266	513	240	889	469	1600	455	174	73	173	188
20	86	312	588	240	858	588	1350	621	160	71	146	201
21	95	438	682	240	1070	661	1140	628	150	74	128	215
22	89	527	695	237	1220	579	958	592	146	88	137	211
23	79	543	641	233	1370	514	792	708	132	77	143	204
24	78	552	691	240	1700	562	683	784	127	74	131	202
25	79	606	1320	250	1500	547	608	714	119	69	129	180
26	79	592	2340	250	1000	545	545	771	106	66	121	160
27	79	487	2180	240	900	609	499	745	116	61	110	142
28	80	415	1560	230	800	1110	501	634	430	65	99	130
29	83	446	1350	220	---	2450	686	558	489	88	93	119
30	80	550	1120	220	---	2760	700	523	464	135	87	109
31	82	---	773	343	---	2070	---	555	---	129	89	---
TOTAL	2565	11726	28190	10372	19686	25603	47622	36886	10556	3874	7485	3470
MEAN	82.7	391	909	335	703	826	1587	1190	352	125	241	116
MAX	118	606	2340	625	1700	2760	4590	4220	677	409	1420	215
MIN	71	100	352	220	260	418	499	446	106	61	87	59
CFSM	.10	.47	1.08	.40	.84	.98	1.89	1.42	.42	.15	.29	.14
IN.	.11	.52	1.25	.46	.87	1.13	2.11	1.63	.47	.17	.33	.15

CAL YR 1982 TOTAL 221765 MEAN 608 MAX 8500 MIN 58 CFSM .72 IN 9.81
WTR YR 1983 TOTAL 208035 MEAN 570 MAX 4590 MIN 59 CFSM .68 IN 9.20

04154000 CHIPPEWA RIVER NEAR MOUNT PLEASANT, MI

LOCATION.--Lat 43°37'32", long 84°42'28", in NW1/4 NW1/4 sec.8, T.14 N., R.3 W., Isabella County, Hydrologic Unit 04080202, on right bank 12 ft downstream from bridge on South Leaton Road, 3.8 mi northeast of Mount Pleasant, and 36 mi upstream from mouth.

DRAINAGE AREA.--416 mi^2.

PERIOD OF RECORD.--October 1930 to September 1931, October 1932 to current year. Monthly discharge only for some periods published in WSP 1307. Gage-height records for flood seasons collected in this vicinity 1910-27, are contained in reports of U.S. Weather Bureau.

REVISED RECORDS.--WSP 744: Drainage area. WSP 1337: 1931, 1933-40, 1945, 1948-49.

GAGE.--Water-stage recorder. Datum of gage is 710.38 ft National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Prior to Oct. 21, 1938, nonrecording gage at site 30 ft upstream at present datum.

REMARKS.--Records good except those for the winter period, which are poor. Diurnal fluctuation below 750 ft^3/s caused by powerplant at Mount Pleasant prior to 1962, occasional regulation at low flow since. Since July 30, 1968, occasional regulation by control structures on lake outlets. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--52 years, 307 ft^3/s, 10.02 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,960 ft^3/s Mar. 8, 1946, gage height, 12.78 ft; minimum, 12 ft^3/s Aug. 18, 1945; minimum daily, 19 ft^3/s Aug. 16, 1936; minimum gage height, 2.70 ft Oct. 8, 1966.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 1,000 ft^3/s and maximum (*):

Date	Time	Discharge (ft³/s)	Gage height (ft)	Date	Time	Discharge (ft³/s)	Gage height (ft)
Dec. 3	2100	1,680	7.40	Apr. 10	1900	1,420	6.72
Dec. 6	1600	1,280	6.33	Apr. 15	0600	*1,790	*7.69
Apr. 4	1700	1,160	5.99	May 8	2100	1,460	6.82

Minimum discharge, 131 ft^3/s July 27, 28, Aug. 10; minimum gage height, 2.94 ft July 27, 28.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	184	384	394	430	286	334	623	443	646	211	160	160
2	182	490	494	395	299	333	844	548	586	203	154	161
3	181	447	1390	370	320	339	893	547	536	199	148	158
4	181	413	1360	360	310	347	1100	540	529	207	147	155
5	179	393	1010	360	290	353	1100	519	576	190	146	153
6	179	379	1210	369	284	413	987	483	553	166	143	169
7	179	371	997	371	284	696	921	498	508	162	141	183
8	179	367	788	361	273	811	851	1190	461	161	139	189
9	176	356	725	356	269	938	790	1190	428	159	136	186
10	179	370	695	366	275	734	1210	930	398	155	134	173
11	182	389	635	402	270	621	1190	817	367	153	157	168
12	184	473	556	382	265	551	972	714	339	152	153	166
13	185	464	491	372	260	511	884	626	318	148	148	166
14	184	427	454	362	248	480	1260	550	301	146	146	163
15	188	405	446	364	267	458	1660	504	287	145	144	163
16	185	384	440	360	299	437	1300	453	275	144	141	183
17	183	373	423	355	446	426	1210	424	257	142	138	197
18	184	361	410	350	448	404	1070	404	243	142	138	320
19	185	357	404	345	362	496	918	434	234	146	137	410
20	200	394	404	340	494	547	802	496	220	146	135	385
21	221	411	394	330	465	489	724	482	207	149	134	425
22	221	396	381	320	430	458	661	486	204	148	182	378
23	225	405	375	310	444	446	612	491	200	144	206	320
24	221	424	423	300	421	437	572	468	193	143	180	279
25	214	393	611	300	381	353	535	478	187	139	169	264
26	212	377	641	300	355	309	491	478	183	136	162	270
27	208	368	518	300	342	391	483	450	187	132	160	267
28	208	364	534	290	334	464	467	431	210	140	157	258
29	245	382	598	290	---	508	459	465	216	146	156	247
30	256	395	465	293	---	535	460	539	219	157	157	237
31	282	---	430	304	---	535	---	588	---	157	162	---
TOTAL	6172	11912	19096	10707	9421	15154	26049	17666	10068	4868	4710	6953
MEAN	199	397	616	345	336	489	868	570	336	157	152	232
MAX	282	490	1390	430	494	938	1660	1190	646	211	206	425
MIN	176	356	375	290	248	309	459	404	183	132	134	153
CFSM	.48	.95	1.48	.83	.81	1.18	2.09	1.37	.81	.38	.37	.56
IN.	.55	1.07	1.71	.96	.84	1.36	2.33	1.58	.90	.44	.42	.62

CAL YR 1982 TOTAL 141284 MEAN 387 MAX 1390 MIN 170 CFSM .93 IN 12.63
WTR YR 1983 TOTAL 142776 MEAN 391 MAX 1660 MIN 132 CFSM .94 IN 12.77

04155000 PINE RIVER AT ALMA, MI

LOCATION.--Lat 43°22'46", long 84°39'20", in SW1/4 SE1/4 sec.34, T.12 N., R.3 W., Gratiot County, Hydrologic Unit 04080202, on right bank 270 ft downstream from Superior Street Bridge in Alma, 0.6 mi downstream from municipal reservoir, and 38 mi upstream from mouth.

DRAINAGE AREA.--288 mi^2.

PERIOD OF RECORD.--October 1930 to current year. Gage-height records for flood seasons collected in this vicinity 1910-28 are contained in reports of U.S. Weather Bureau.

REVISED RECORDS.--WSP 744: Drainage area. WSP 1307: 1945(M), WSP 1337: 1931, 1932-34(M), 1936, 1939, 1945, 1949.

GAGE.--Water-stage recorder. Datum of gage is 718.37 ft National Geodetic Vertical Datum of 1929. Prior to Dec. 10, 1930, nonrecording gage at Superior Street Bridge at different datum. Dec. 10, 1930, to June 15, 1938, nonrecording gage at site 70 ft downstream from bridge and June 16 to Oct. 25, 1938, nonrecording gage at bridge at present datum.

REMARKS.--Records good except those for the winter period, which are poor. Occasional regulation caused by dam 0.6 mi above station and by variable backwater from powerplant at St. Louis, 5.2 mi below station. About 4.0 ft^3/s diverted above station for municipal and industrial use; sewage effluent is returned below station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--53 years, 215 ft^3/s, 10.14 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,400 ft^3/s Mar. 19, 1948, gage height, 10.81 ft; minimum daily, 0.40 ft^3/s Sept. 6, 1964, caused by closing dam during construction of waterworks.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,460 ft^3/s Apr. 14, gage height, 6.49 ft; minimum, 36 ft^3/s Aug. 10; minimum gage height, 0.68 ft July 27, 28.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	154	173	247	403	194	271	548	399	411	174	92	55
2	153	166	312	343	236	275	664	718	413	183	76	59
3	135	208	565	300	294	275	789	737	408	162	72	60
4	121	257	610	250	245	270	851	711	401	128	74	62
5	119	298	708	255	210	289	781	659	373	134	62	65
6	96	292	952	275	185	313	757	576	357	139	52	86
7	83	257	929	273	170	434	747	537	370	107	52	87
8	73	217	822	248	155	513	698	775	325	104	49	77
9	73	178	749	257	150	600	674	726	299	113	40	87
10	88	175	639	258	150	590	865	759	257	140	40	93
11	97	193	558	266	150	595	832	800	238	132	55	100
12	88	250	412	270	150	554	814	683	229	95	70	84
13	97	266	359	296	152	490	860	554	197	81	91	62
14	102	285	327	280	171	428	1280	476	179	85	110	67
15	98	296	320	239	211	383	1260	414	165	74	107	79
16	101	305	348	181	281	336	1100	365	155	69	82	93
17	121	256	320	171	356	307	1100	338	145	73	60	102
18	135	219	320	169	363	296	892	320	141	72	47	167
19	106	202	300	168	415	310	738	370	164	62	43	159
20	103	229	314	165	481	328	628	475	171	57	40	199
21	92	254	302	160	476	388	556	479	139	60	42	241
22	104	272	304	154	434	387	480	513	119	63	52	224
23	118	284	294	152	447	364	439	514	107	69	68	203
24	141	302	319	150	432	328	409	443	100	73	73	181
25	155	277	521	150	403	320	379	429	117	70	82	173
26	132	272	582	150	352	312	345	414	144	57	84	158
27	122	257	571	150	324	318	345	375	125	50	73	139
28	118	248	605	150	279	381	307	365	150	54	83	136
29	116	234	577	159	---	447	322	374	181	74	79	147
30	117	226	510	178	---	473	355	338	200	70	61	150
31	140	---	443	198	---	488	---	360	---	83	52	---
TOTAL	3498	7340	15139	6818	7866	12063	20815	15996	6780	2907	2063	3595
MEAN	113	245	488	220	281	389	694	516	226	93.8	66.5	120
MAX	155	305	952	403	481	600	1280	800	413	183	110	241
MIN	73	166	247	150	150	270	307	320	100	50	40	55
CFSM	.39	.85	1.69	.76	.98	1.35	2.41	1.79	.79	.33	.23	.42
IN.	.45	.95	1.96	.88	1.02	1.56	2.69	2.07	.88	.38	.27	.46

CAL YR 1982 TOTAL 100075 MEAN 274 MAX 1750 MIN 49 CFSM .95 IN 12.93
WTR YR 1983 TOTAL 104880 MEAN 287 MAX 1280 MIN 40 CFSM 1.00 IN 13.55

04155500 PINE RIVER NEAR MIDLAND, MI

LOCATION.--Lat 43°33'52", long 84°22'09", in SW1/4 NW1/4 sec.4, T.13 N., R.1 E., Midland County, Hydrologic Unit 04080202, on left bank at downstream side of bridge on Meridian Road, 7.2 mi southwest of Midland, and 7.8 mi upstream from Chippewa River.

DRAINAGE AREA.--390 mi², approximately.

PERIOD OF RECORD.--May 1934 to September 1938, February 1948 to current year.

REVISED RECORDS.--WSP 1207: Drainage area. WSP 1307: 1935(M). WSP 1337: 1936-38, 1948-49.

GAGE.--Water-stage recorder. Datum of gage is 623.94 ft National Geodetic Vertical Datum of 1929. Prior to Sept. 30, 1938, nonrecording gage at same site, at datum 5.55 ft lower. Feb. 3, 1948, to Dec. 13, 1951, nonrecording gage at present site and datum.

REMARKS.--Records fair except those for the winter period, which are poor. Regulation at low and medium flows by hydroelectric powerplant at St. Louis. Some diversion above station for irrigation. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--39 years, 298 ft³/s, 10.38 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 6,360 ft³/s Mar. 20, 1948, gage height, 10.00 ft, from graph based on gage readings; maximum gage height, 12.08 ft Feb. 2, 1968, backwater from ice; minimum discharge not determined.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 1,200 ft³/s and maximum (*):

Date	Time	Discharge (ft³/s)	Gage height (ft)	Date	Time	Discharge (ft³/s)	Gage height (ft)
Dec. 4	0900	1,240	4.87	Apr. 14	2400	*2,330	*6.21
Dec. 6	1400	1,430	5.12	Apr. 18	0400	1,410	5.10
Apr. 3	1300	1,340	5.00	May 2	2000	1,580	5.30
Apr. 10	2100	1,660	5.40	May 8	2100	1,640	5.38

Minimum discharge, 27 ft³/s Aug. 24, gage height, 2.08 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	120	110	227	470	220	340	773	447	495	344	78	127
2	101	319	316	440	230	336	994	1060	536	275	136	67
3	130	159	786	400	250	392	1290	1240	515	218	160	68
4	128	190	1070	360	270	413	1210	957	570	274	77	68
5	96	257	860	300	280	361	1130	826	540	108	123	69
6	157	307	1180	299	220	474	873	743	505	123	174	79
7	136	280	1190	333	210	534	926	601	381	182	79	70
8	137	208	897	340	200	682	858	1150	479	140	79	161
9	100	243	894	276	190	850	783	1030	374	108	140	84
10	73	202	776	315	140	828	1190	886	399	73	76	84
11	73	197	716	324	130	722	1260	877	334	81	88	85
12	137	223	761	422	130	690	1060	881	268	178	90	84
13	87	298	645	336	130	637	987	755	314	153	90	188
14	103	288	573	410	130	536	1780	543	265	71	76	67
15	105	285	397	350	200	446	2020	517	265	114	77	69
16	111	222	396	150	250	456	1470	458	252	127	152	81
17	71	332	470	230	400	402	1200	442	244	66	155	105
18	73	260	443	290	450	376	1140	318	251	68	132	99
19	161	195	392	210	500	460	924	449	121	129	120	240
20	145	216	340	160	560	471	807	810	126	128	81	188
21	147	257	436	200	640	400	623	674	255	65	63	225
22	132	264	344	190	580	496	651	638	245	73	71	303
23	138	326	396	180	560	480	489	709	191	70	57	281
24	80	310	446	170	540	413	473	666	210	68	73	229
25	80	361	679	170	500	403	432	547	90	67	121	184
26	178	282	972	170	450	424	441	640	91	107	72	186
27	144	288	714	170	384	432	304	542	147	102	131	226
28	124	234	774	175	391	519	489	477	222	95	72	221
29	131	286	779	180	---	565	336	434	172	85	72	142
30	119	280	623	190	---	676	398	578	202	192	132	118
31	81	---	560	210	---	704	---	461	---	74	135	---
TOTAL	3598	7679	20052	8420	9135	15918	27311	21356	9059	3958	3182	4198
MEAN	116	256	647	272	326	513	910	689	302	128	103	140
MAX	178	361	1190	470	640	850	2020	1240	570	344	174	303
MIN	71	110	227	150	130	336	304	318	90	65	57	67
CFSM	.30	.66	1.66	.70	.84	1.32	2.33	1.77	.77	.33	.26	.36
IN.	.34	.73	1.91	.80	.87	1.52	2.61	2.04	.86	.38	.30	.40

CAL YR 1982 TOTAL 126342 MEAN 346 MAX 3000 MIN 55 CFSM .89 IN 12.05
WTR YR 1983 TOTAL 133866 MEAN 367 MAX 2020 MIN 57 CFSM .94 IN 12.77

04156000 TITTABAWASSEE RIVER AT MIDLAND, MI

LOCATION.--Lat 43°35'43", long 84°14'08", in NW1/4 NE1/4 sec.28, T.14 N., R.2 E., Midland County, Hydrologic Unit 04080201, on right bank 2,000 ft downstream from dam at Dow Chemical Co. powerplant in Midland, 0.7 mi upstream from Bullock Creek, 1.4 mi downstream from Chippewa River and 23 mi upstream from mouth.

DRAINAGE AREA.--2,400 mi^2, approximately.

PERIOD OF RECORD.--March 1936 to current year. Gage-height records for flood seasons collected in this vicinity 1910-26, 1928, and since 1946 are contained in reports of U.S. Weather Bureau.

REVISED RECORDS.--WSP 1045: 1945. WSP 1144: 1948.

GAGE.--Water-stage recorder. Datum of gage is 580.28 ft National Geodetic Vertical Datum of 1929. Prior to Sept. 30, 1955, at datum 10.00 ft higher.

REMARKS.--Records good. Water is diverted from river a short distance above station for industrial use. Small part returned to river 0.25 mi below station, remainder returned 1 mi below. Extremes and daily discharges not adjusted for diversion. Prior to May 20, 1970, discharge below 4,000 ft^3/s regulated by dam 2,000 ft above station; fixed crest dam since. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--47 years, 1,678 ft^3/s, 9.49 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 34,000 ft^3/s Mar. 21, 1948, gage height, 29.50 ft; minimum, 39 ft^3/s Oct. 1, 1942; minimum daily, 111 ft^3/s Aug. 21, 1949; minimum gage height, 9.04 ft Aug. 19, 1954, caused by bridge construction above station.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum stage known since at least 1907, 29.7 ft Mar. 28, 1916, discharge, 34,800 ft^3/s, from information by U.S. Weather Bureau.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 7,000 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Dec. 4	2030	8,790	18.88	Apr. 15	2000	*13,900	*23.10
Apr. 5	0130	9,070	19.02	May 9	0830	10,900	20.83
Apr. 11	1500	8,690	18.64				

Minimum discharge, 252 ft^3/s Aug. 21, gage height, 9.23 ft; minimum daily, 272 ft^3/s Aug. 21.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	895	817	1810	3430	1710	2450	5520	1580	5830	1920	891	883
2	517	1660	2140	1650	1710	2450	6300	3920	4640	1110	618	838
3	360	2050	5100	1860	2250	3520	7740	6390	3880	553	583	364
4	364	1410	8220	2190	2750	3680	8670	5510	3780	664	504	293
5	489	1490	7910	2290	1580	3680	8650	4900	2860	866	536	282
6	728	878	7880	1770	1010	2150	6960	4430	3030	846	458	628
7	581	774	7460	1400	1410	3200	5940	4080	3490	836	349	660
8	549	1220	5710	1020	1540	5540	5460	7690	3440	687	466	578
9	358	1100	4860	969	1280	5960	5040	10500	2260	431	500	859
10	318	1090	4490	1530	1520	6070	6390	8070	2290	380	465	414
11	445	1290	4100	2090	1760	5100	8500	5650	1340	505	706	322
12	699	1620	2050	2520	976	4680	7430	5050	818	630	719	614
13	879	1480	2150	2440	596	4270	6300	4560	1540	577	362	742
14	916	960	2440	2450	1190	4000	9110	4140	1880	503	287	638
15	910	1480	2420	1530	1320	3790	13100	3930	1350	540	717	619
16	433	1510	2300	883	1490	3500	12300	3660	1060	443	968	699
17	337	1460	2320	1700	2330	3550	8700	3560	1030	372	969	417
18	647	1530	1510	3180	3160	3470	6420	2110	675	666	735	1170
19	605	1590	1130	2840	4200	2390	5490	2610	533	769	668	1580
20	936	1150	1810	1970	2700	4530	4960	5350	839	610	330	1610
21	832	729	2280	1880	3280	4240	4470	4890	1010	539	272	1530
22	825	1600	2280	1490	4670	3780	4480	3580	784	534	803	1760
23	498	2090	2310	1210	4480	3020	3970	4460	699	406	741	1900
24	404	3050	1650	1640	4280	3010	2250	4250	711	368	912	1860
25	855	1380	2110	1750	3660	2920	2270	3960	478	495	779	974
26	1230	1680	4580	1540	3550	1960	2430	4340	425	510	523	1400
27	1140	1140	4780	1810	1770	1500	2080	3820	595	501	407	1620
28	921	722	4490	2100	2060	2690	1840	3480	1190	500	341	1450
29	735	1250	4670	1070	---	5000	2220	2460	1100	520	457	1080
30	442	1840	4280	788	---	5430	1630	4600	1300	510	535	829
31	400	---	3910	1540	---	5300	---	5850	---	409	566	---
TOTAL	20248	42040	115150	56530	64232	116830	176620	143380	54857	19200	18167	28613
MEAN	653	1401	3715	1824	2294	3769	5887	4625	1829	619	586	954
MAX	1230	3050	8220	3430	4670	6070	13100	10500	5830	1920	969	1900
MIN	318	722	1130	788	596	1500	1630	1580	425	368	272	282
†	12.1	19.2	20.6	15.0	12.5	15.5	20.0	15.6	13.8	15.5	12.8	21.0
MEAN ‡	665	1420	3736	1839	2306	3784	5907	4641	1843	634	599	975
CFSM ‡	.28	.59	1.56	.77	.96	1.58	2.46	1.93	.77	.26	.25	.41
IN ‡	.32	.66	1.79	.88	1.00	1.82	2.75	2.23	.86	.30	.29	.45

CAL YR 1982 TOTAL 789949 MEAN 2164 MAX 10800 MIN 298 MEAN ‡ 2180 CFSM ‡ .91 IN ‡ 12.33
WTR YR 1983 TOTAL 855867 MEAN 2345 MAX 13100 MIN 272 MEAN ‡ 2361 CFSM ‡ .98 IN ‡ 13.35

† Diversion, in cubic feet per second, for industrial use furnished by Dow Chemical Co.

‡ Adjusted for diversion.

04157000 SAGINAW RIVER AT SAGINAW, MI
(National stream-quality accounting network station)

LOCATION.--Lat 43°24'46", long 83°57'47", in NW1/4 SE1/4 sec.26, T.12 N., R.4 E., Saginaw County, Hydrologic Unit 04080206, on right bank 1,000 ft downstream from bridge on Rust Avenue in Saginaw, 1.9 mi downstream from Tittabawassee River and 20.3 mi upstream from mouth. Water quality sampling site at downstream side of bridge on Rust Avenue.

DRAINAGE AREA.--6,060 mi^2, approximately.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--1904, 1908-9, 1912-13, 1916, 1918-19, 1929-30, and 1942 (flood discharge for certain periods only) in WSP 1084; December 1942 to current year (high-water periods only); no high water 1944, 1949, 1953, 1955, 1958, 1961, 1963, 1964, 1966. Gage-height records for flood seasons collected in this vicinity 1910-20, and for entire years since 1921 are contained in reports of U.S. Weather Bureau.

GAGE.--Water-stage recorder. Datum of gage is 565.11 ft, International Great Lakes datum. Prior to Oct. 1, 1972, nonrecording gage at site 1.9 mi downstream at same datum. Auxiliary water-stage recorder on right bank near Aplin Beach, 19.9 mi downstream.

REMARKS.--Water-discharge records good. Considerable diversion through metropolitan area of Saginaw. National Weather Service gage-height telemark at station.

COOPERATION.--Auxiliary gage-height record furnished by NOAA-National Ocean Survey.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 68,000 ft^3/s Mar. 30, 1904, gage height, 24.9 ft, site then in use.

EXTREMES FOR CURRENT YEAR.--Maximum daily discharge, 21,800 ft^3/s Apr. 16; maximum daily gage height, 17.26 ft Apr. 17.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1			---			---	14700	---				
2			---			---	13900	14200				
3			---			---	17900	17000				
4			11400			---	18000	19100				
5			14600			---	18000	17200				
6			15700			---	17400	15000				
7			13500			---	15500	11000				
8			12900			10200	12900	16100				
9			12200			11100	13000	18200				
10			---			11100	14300	18800				
11			---			10700	15200	16400				
12			---			10200	15900	13400				
13			---			---	16100	11400				
14			---			---	18000	---				
15			---			---	18500	---				
16			---			---	21800	---				
17			---			---	21600	---				
18			---			---	19200	---				
19			---			---	16400	---				
20			---			---	14400	---				
21			---			11900	13000	---				
22			---			10300	12200	---				
23			---			---	11400	---				
24			---			---	10100	---				
25			---			---	---	---				
26			11300			---	---	---				
27			13400			---	---	---				
28			13000			---	---	---				
29			11900			13000	---	---				
30			12000			15000	---	---				
31			---			15100	---	---				

04157000 SAGINAW RIVER AT SAGINAW, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1975 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: November 1974 to September 1981.
WATER TEMPERATURES: November 1974 to September 1981.

INSTRUMENTATION.--Water-quality monitor November 1976 to September 1981.

REMARKS.--Quarterly samples are collected as a cross-section sample at Rust Ave. bridge. Occasional winter samples are collected near vicinity of Court St. bridge. Water-discharge measurements are made at times of sampling.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE (water years 1975, 1977, 1979): Maximum recorded, 1,230 micromhos Jan. 5, 1977; minimum recorded, 224 micromhos Mar. 13, 1977.
WATER TEMPERATURES (water years 1975-77, 1979): Maximum, 30.0°C July 10, 14, 20, 1977; minimum, 0.0°C on many days during winter periods.

WATER QUALITY DATA, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DATE	TIME	STREAM-FLOW, INSTANTANEOUS (CFS)	SPECIFIC CONDUCTANCE (UMHOS)	PH (STANDARD UNITS)	TEMPERATURE (DEG C)	TURBIDITY (NTU)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)	COLIFORM, FECAL, 0.7 UM-MF (COLS./100 ML)	STREPTOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)
OCT										
20...	1130	4160	723	7.8	12.0	5.7	7.8	75	410	320
MAR										
09...	1100	9640	570	7.8	6.5	35	10.8	90	E670	K16000
MAY										
25...	1200	5110	525	7.7	15.5	24	8.2	83	430	--
AUG										
31...	1000	831	740	7.9	26.0	18	8.3	102	920	220

DATE	HARDNESS (MG/L AS CACO3)	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	PERCENT SODIUM	SODIUM ADSORPTION RATIO	POTASSIUM, DISSOLVED (MG/L AS K)	ALKALINITY LAB (MG/L AS CACO3)	CARBON DIOXIDE DISSOLVED (MG/L AS CO2)
OCT									
20...	263	69	22	48	28	1.3	3.4	190	6.3
MAR									
09...	234	64	18	19	14	.5	3.0	160	4.9
MAY									
25...	234	64	18	18	14	.5	2.1	170	6.6
AUG									
31...	253	65	22	63	35	1.8	3.6	170	4.1

DATE	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, DISSOLVED (MG/L AS F)	SILICA, DISSOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	SOLIDS, DISSOLVED (TONS PER AC-FT)	SOLIDS, DISSOLVED (TONS PER DAY)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N)
OCT									
20...	58	88	.3	4.2	484	417	.66	5440	1.1
MAR									
09...	57	48	.2	4.7	363	310	.49	9450	2.7
MAY									
25...	42	35	.2	4.8	364	287	.50	5020	1.7
AUG									
31...	54	110	.3	3.8	486	425	.66	1090	.59

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04157000 SAGINAW RIVER AT SAGINAW, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DATE	NITROGEN, AMMONIA DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS, DISSOLVED (MG/L AS P)	PHOSPHORUS, ORTHO, DISSOLVED (MG/L AS P)	PHOSPHATE, ORTHO, DISSOLVED (MG/L AS PO4)	SEDIMENT, SUSPENDED (MG/L)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
OCT 20...	.430	1.30	.160	.030	.040	.12	45	505	--
MAR 09...	.170	1.30	.120	.030	.020	.06	62	1610	95
MAY 25...	.100	1.20	.090	.030	.020	.06	52	717	96
AUG 31...	.220	2.20	.170	.010	.030	.09	24	54	99

DATE	TIME	ALUMINUM, DISSOLVED (UG/L AS AL)	ARSENIC DISSOLVED (UG/L AS AS)	BARIUM, DISSOLVED (UG/L AS BA)	BERYLLIUM, DISSOLVED (UG/L AS BE)	CADMIUM DISSOLVED (UG/L AS CD)	CHROMIUM, DISSOLVED (UG/L AS CR)	COBALT, DISSOLVED (UG/L AS CO)	COPPER, DISSOLVED (UG/L AS CU)	IRON, DISSOLVED (UG/L AS FE)	LEAD, DISSOLVED (UG/L AS PB)
OCT 20...	1130	60	2	55	<1	<1	<1	<3	5	4	2
MAR 09...	1100	10	1	44	<1	<1	<1	<3	6	57	2
MAY 25...	1200	130	1	50	1	<1	<1	<3	3	78	4
AUG 31...	1000	30	4	64	<1	<1	<1	<3	2	6	<1

DATE	LITHIUM DISSOLVED (UG/L AS LI)	MANGANESE, DISSOLVED (UG/L AS MN)	MERCURY DISSOLVED (UG/L AS HG)	MOLYBDENUM, DISSOLVED (UG/L AS MO)	NICKEL, DISSOLVED (UG/L AS NI)	SELENIUM, DISSOLVED (UG/L AS SE)	SILVER, DISSOLVED (UG/L AS AG)	STRONTIUM, DISSOLVED (UG/L AS SR)	VANADIUM, DISSOLVED (UG/L AS V)	ZINC, DISSOLVED (UG/L AS ZN)
OCT 20...	9	17	.2	<10	7	<1	<1	450	<6.0	6
MAR 09...	<4	18	.1	<10	1	<1	<1	270	<6.0	<3
MAY 25...	<4	15	<.1	<10	1	<1	<1	230	<6.0	<3
AUG 31...	11	1	<.1	<10	4	<1	<1	440	<6.0	8

04159010 PIGEON RIVER NEAR CASEVILLE, MI
(National stream-quality accounting network station)

LOCATION.--Lat 43°56'22", long 83°14'30", in SW1/4 NW1/4 sec.31, T.18 N., R.11 E., Huron County, Hydrologic Unit 04080103, at bridge on Kinde Road, 1.5 mi east of Caseville, and 3.1 mi upstream from mouth.

DRAINAGE AREA.--125 mi^2.

PERIOD OF RECORD.--January 1978 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: April 1978 to September 1981.
WATER TEMPERATURES: April 1978 to September 1981.

REMARKS.--Quarterly samples are collected as a cross-section sample at or near vicinity of bridge. Water-discharge measurements are made at times of sampling. Some regulation at low flows.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum daily recorded (water year 1980), 2,000 micromhos Oct. 20, 1979; minimum daily recorded (water year 1979), 175 micromhos Mar. 6, 1979.
WATER TEMPERATURES: Maximum daily recorded (water year 1978), 27.5°C July 7, 1978; minimum daily recorded, 0.0°C on many days during winter periods.

WATER QUALITY DATA, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (STAND-ARD UNITS)	TEMPER-ATURE (DEG C)	TUR-BID-ITY (NTU)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)
OCT										
19...	1330	2.3	794	7.9	11.0	4.5	8.9	82	200	200
MAR										
08...	1230	116	890	8.0	9.5	2.4	11.3	102	K280	9400
MAY										
24...	1400	148	769	8.1	15.0	9.5	11.4	113	500	--
AUG										
30...	1400	4.2	682	7.8	22.0	3.4	7.0	80	2200	4600

DATE	HARD-NESS (MG/L AS CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	PERCENT SODIUM	SODIUM AD-SORP-TION RATIO	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	ALKA-LINITY LAB (MG/L AS CACO3)	CARBON DIOXIDE DIS-SOLVED (MG/L AS CO2)
OCT									
19...	375	99	31	24	12	.6	8.1	240	7.1
MAR									
08...	403	110	31	12	6	.3	2.9	230	4.4
MAY									
24...	403	110	31	13	7	.3	3.1	220	3.4
AUG									
30...	343	91	28	19	11	.5	5.0	200	6.1

DATE	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER AC-FT)	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)
OCT									
19...	130	52	.3	1.6	507	484	.69	3.1	<.10
MAR									
08...	130	65	.2	2.1	616	492	.84	193	12
MAY									
24...	97	44	.3	2.4	539	433	.73	215	9.0
AUG									
30...	120	45	.3	4.5	476	433	.65	5.4	.87

04159010 PIGEON RIVER NEAR CASEVILLE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DATE	NITROGEN, AMMONIA DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS, DISSOLVED (MG/L AS P)	PHOSPHORUS, ORTHO, DISSOLVED (MG/L AS P)	PHOSPHATE, ORTHO, DISSOLVED (MG/L AS PO4)	SEDIMENT, SUSPENDED (MG/L)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
OCT 19...	.060	.70	.070	.030	.030	.09	20	.12	--
MAR 08...	.100	1.40	.060	.030	.020	.06	19	6.0	--
MAY 24...	.090	.70	.320	.160	.040	.12	44	18	96
AUG 30...	.020	1.30	.120	.110	.090	.28	2	.02	98

DATE	TIME	ALUMINUM, DISSOLVED (UG/L AS AL)	ARSENIC DISSOLVED (UG/L AS AS)	BARIUM, DISSOLVED (UG/L AS BA)	BERYLLIUM, DISSOLVED (UG/L AS BE)	CADMIUM DISSOLVED (UG/L AS CD)	CHROMIUM, DISSOLVED (UG/L AS CR)	COBALT, DISSOLVED (UG/L AS CO)	COPPER, DISSOLVED (UG/L AS CU)	IRON, DISSOLVED (UG/L AS FE)	LEAD, DISSOLVED (UG/L AS PB)
OCT 19...	1330	30	2	67	<1	<1	<1	<3	2	17	<1
MAR 08...	1230	10	1	48	<1	<1	<1	<3	1	18	5
MAY 24...	1400	<10	1	52	1	<1	<1	<3	3	16	3
AUG 30...	1400	<10	3	68	<1	<1	<1	<3	2	16	<1

DATE	LITHIUM DISSOLVED (UG/L AS LI)	MANGANESE, DISSOLVED (UG/L AS MN)	MERCURY DISSOLVED (UG/L AS HG)	MOLYBDENUM, DISSOLVED (UG/L AS MO)	NICKEL, DISSOLVED (UG/L AS NI)	SELENIUM, DISSOLVED (UG/L AS SE)	SILVER, DISSOLVED (UG/L AS AG)	STRONTIUM, DISSOLVED (UG/L AS SR)	VANADIUM, DISSOLVED (UG/L AS V)	ZINC, DISSOLVED (UG/L AS ZN)
OCT 19...	7	19	.2	<10	2	<1	--	410	<6.0	<4
MAR 08...	4	8	.1	<10	1	2	<1	260	<6.0	7
MAY 24...	6	18	.1	<10	<1	1	<1	260	<6.0	6
AUG 30...	12	28	<.1	<10	2	<1	<1	340	<6.0	20

04159130 ST. CLAIR RIVER AT PORT HURON, MI
(National stream-quality accounting network station)

LOCATION.--Lat 42°59'19", long 82°25'29", in SE1/4 sec.3, T.6 N., R.17 E., St. Clair County, Hydrologic Unit 04090001, at Port Huron municipal water treatment plant in Port Huron.

DRAINAGE AREA.--222,400 mi^2, approximately.

PERIOD OF RECORD.--Water years 1970-73, January 1978 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: April 1978 to September 1981.
WATER TEMPERATURES: April 1978 to September 1981.

REMARKS.--Bimonthly samples were collected from a stilling well located in the Port Huron municipal water treatment plant.

COOPERATION.--Water-discharges were furnished by the National Oceanic and Atmospheric Administration.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum daily, 260 micromhos Dec. 18, 1980; minimum daily, 194 micromhos Jan. 27, 28, 1980.
WATER TEMPERATURES: Maximum daily, 24.0°C Aug. 14-16, 1980; minimum daily, 0.0°C on many days during winter periods.

EXTREMES OUTSIDE PERIOD OF DAILY RECORD.--Specific conductance values of 164 micromhos July 3, 1972, and 265 micromhos Mar. 18, 1982, were observed.

WATER QUALITY DATA, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DATE	TIME	DIS-CHARGE, IN CUBIC FEET PER SECOND	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (STAND-ARD UNITS)	TEMPER-ATURE (DEG C)	TUR-BID-ITY (NTU)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD-NESS (MG/L AS CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)
NOV 12...	1115	183000	200	7.7	10.0	1.0	10.5	97	K5	--	101	28
JAN 18...	1030	217000	200	8.2	.0	6.3	15.8	109	<1	>100	--	--
MAR 09...	1500	205000	206	7.4	2.0	<1.0	14.3	106	<1	21	94	26
MAY 18...	1330	211000	216	8.5	9.0	1.7	6.0	52	<1	E4	97	27
JUL 12...	1100	218000	208	8.4	18.5	<1.0	8.0	87	<1	26	100	28
AUG 31...	1200	219000	203	--	22.0	<1.0	9.0	105	K6	21	100	28

DATE	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	PERCENT SODIUM	SODIUM AD-SORP-TION RATIO	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	ALKA-LINITY LAB (MG/L AS CACO3)	CARBON DIOXIDE DIS-SOLVED (MG/L AS CO2)	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)
NOV 12...	7.4	3.6	7	.2	.7	91	3.1	17	5.7	<.1	1.3
JAN 18...	--	--	--	--	.9	92	1.0	17	6.0	.1	--
MAR 09...	7.0	3.4	7	.2	.8	79	6.1	17	5.9	.1	1.4
MAY 18...	7.3	3.7	8	.2	.9	82	.5	18	6.7	<.1	.9
JUL 12...	7.2	3.9	8	.2	.8	91	.6	18	5.9	<.1	1.0
AUG 31...	7.3	3.7	7	.2	.8	91	--	17	5.9	.1	1.3

DATE	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER AC-FT)	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS, DIS-SOLVED (MG/L AS P)	PHOS-PHORUS, ORTHO, DIS-SOLVED (MG/L AS P)	PHOS-PHATE, ORTHO, DIS-SOLVED (MG/L AS PO4)
NOV 12...	109	112	.15	53900	.31	<.010	.30	.010	<.010	<.010	--
JAN 18...	123	--	.17	72100	.29	<.010	.80	.020	.030	<.010	--
MAR 09...	112	109	.15	62000	.35	<.010	.30	<.010	<.010	--	.09
MAY 18...	124	114	.17	70600	.31	<.010	.30	<.010	<.010	<.010	--
JUL 12...	125	113	.17	73600	.28	.020	.10	.020	.020	<.010	--
AUG 31...	123	113	.17	72700	.26	.020	.20	.020	.010	<.010	--

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04159130 ST. CLAIR RIVER AT PORT HURON, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DATE	TIME	ALUMINUM, DIS-SOLVED (UG/L AS AL)	ARSENIC DIS-SOLVED (UG/L AS AS)	BARIUM, DIS-SOLVED (UG/L AS BA)	BERYLLIUM, DIS-SOLVED (UG/L AS BE)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHROMIUM, DIS-SOLVED (UG/L AS CR)	COBALT, DIS-SOLVED (UG/L AS CO)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, DIS-SOLVED (UG/L AS PB)
NOV 12...	1115	30	1	21	<1	<1	<1	<3	1	<3	<1
JAN 18...	1030	<10	2	--	--	--	--	--	--	--	--
MAR 09...	1500	<10	1	18	1	1	<1	3	2	3	4
AUG 31...	1200	30	2	28	<1	<1	<1	<3	6	<3	1

DATE	LITHIUM DIS-SOLVED (UG/L AS LI)	MANGANESE, DIS-SOLVED (UG/L AS MN)	MERCURY DIS-SOLVED (UG/L AS HG)	MOLYBDENUM, DIS-SOLVED (UG/L AS MO)	NICKEL, DIS-SOLVED (UG/L AS NI)	SELENIUM, DIS-SOLVED (UG/L AS SE)	SILVER, DIS-SOLVED (UG/L AS AG)	STRONTIUM, DIS-SOLVED (UG/L AS SR)	VANADIUM, DIS-SOLVED (UG/L AS V)	ZINC, DIS-SOLVED (UG/L AS ZN)
NOV 12...	<4	<1	<.1	<10	1	<1	<1	100	<6.0	<4
JAN 18...	--	--	<.1	--	--	--	<1	--	--	--
MAR 09...	4	1	.1	10	4	<1	<1	95	6.0	3
AUG 31...	<4	<1	<.1	<10	1	<1	<1	100	<6.0	7

04159500 BLACK RIVER NEAR FARGO, MI

LOCATION.--Lat 43°05'32", long 82°37'05", in NW1/4 sec.32, T.8 N., R.16 E., St. Clair County, Hydrologic Unit 04090001, on left bank 20 ft downstream from bridge on Norman Road, 2.1 mi east of Fargo, 5.3 mi upstream from Mill Creek, and 12 mi northwest of Port Huron.

DRAINAGE AREA.--480 mi^2.

PERIOD OF RECORD.--February 1944 to current year.

REVISED RECORDS.--WSP 1307: 1950(M). WSP 1627: 1956-58. WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 613.75 ft National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Prior to July 9, 1954, nonrecording gage at same site and datum.

REMARKS.--Records good except those for period of no gage-height record, June 6 to July 18, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--39 years, 281 ft^3/s, 7.95 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 14,400 ft^3/s Apr. 5, 1947, gage height, 16.06 ft, from floodmark, from rating curve extended above 9,500 ft^3/s; maximum gage height observed, 18.05 ft Feb. 20, 1951, backwater from ice; minimum discharge observed, 1.8 ft^3/s Sept. 18, 19, 1946.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 3,520 ft^3/s May 2, gage height, 9.67 ft, only peak above base of 3,500 ft^3/s; minimum, 14 ft^3/s Sept. 9, 10, gage height, 1.77 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	39	20	282	190	218	271	565	1340	175	70	49	25
2	35	26	241	160	192	282	501	2710	171	52	46	25
3	33	91	190	130	578	297	462	2920	155	45	37	25
4	30	116	260	120	873	314	531	1780	285	40	41	24
5	28	99	426	115	477	340	526	764	302	38	61	23
6	26	71	535	112	320	333	376	488	284	62	70	22
7	26	56	680	104	204	339	314	370	270	50	59	22
8	33	47	399	102	159	458	342	352	230	40	46	20
9	29	40	247	97	125	652	357	539	170	35	43	16
10	23	39	177	90	110	557	957	461	130	30	42	15
11	23	41	150	97	100	396	1440	320	105	28	52	16
12	22	41	133	110	94	294	1210	258	95	28	428	16
13	25	72	120	105	86	223	849	215	84	29	593	16
14	25	129	110	100	80	193	1030	199	76	28	272	16
15	24	102	100	92	74	179	2780	197	75	26	141	16
16	24	77	121	85	105	165	2380	169	68	25	92	18
17	23	63	190	80	252	145	1030	145	58	24	70	21
18	24	54	200	76	425	133	587	128	52	23	56	20
19	20	48	201	74	392	148	641	119	48	28	47	24
20	18	51	194	70	355	325	1040	151	44	27	42	40
21	20	105	269	68	380	372	1120	188	41	25	38	72
22	22	231	306	67	450	227	629	197	38	25	36	152
23	22	188	243	67	581	176	414	405	36	30	38	136
24	22	179	306	68	785	192	320	252	35	35	52	95
25	21	293	869	75	531	187	262	188	34	27	48	70
26	21	220	1580	78	334	204	229	171	33	24	38	56
27	19	149	1280	90	250	302	207	161	32	24	32	46
28	17	113	600	78	240	1260	182	143	50	22	29	40
29	18	105	563	68	---	2190	177	132	80	27	28	35
30	18	170	458	64	---	1510	260	151	90	52	27	32
31	19	---	254	93	---	741	---	182	---	44	26	---
TOTAL	749	3036	11684	2925	8770	13405	21718	15795	3346	1063	2679	1154
MEAN	24.2	101	377	94.4	313	432	724	510	112	34.3	86.4	38.5
MAX	39	293	1580	190	873	2190	2780	2920	302	70	593	152
MIN	17	20	100	64	74	133	177	119	32	22	26	15
CFSM	.05	.21	.79	.20	.65	.90	1.51	1.06	.23	.07	.18	.08
IN.	.06	.24	.91	.23	.68	1.04	1.68	1.22	.26	.08	.21	.09

CAL YR 1982 TOTAL 125020 MEAN 343 MAX 7210 MIN 16 CFSM .72 IN 9.69
WTR YR 1983 TOTAL 86324 MEAN 237 MAX 2920 MIN 15 CFSM .49 IN 6.69

04160570 NORTH BRANCH BELLE RIVER AT IMLAY CITY, MI

LOCATION.--Lat 43°01'49", long 83°04'02", in SW1/4 NW1/4 sec.16, T.7 N., R.12 E., Lapeer County, Hydrologic Unit 04090001, on left bank 12 ft upstream from bridge on State Highway 21, and 0.6 mi northeast of Imlay City.

DRAINAGE AREA.--18.0 mi^2.

PERIOD OF RECORD.--August 1965 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 800 ft from topographic map (nearest 10 ft).

REMARKS.--Records good. Some diversion by pumping for sprinkler irrigation. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--18 years, 11.3 ft^3/s, 8.53 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 334 ft^3/s Apr. 19, 1975, gage height, 9.33 ft; no flow for part of each day June 27, 28, 1977, June 26-28, 1979, caused by irrigation pumpage.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 60 ft^3/s and maximum (*):

Date	Time	Discharge (ft³/s)	Gage height (ft)	Date	Time	Discharge (ft³/s)	Gage height (ft)
Apr. 14	2100	87	3.90	May 2	1000	*104	*4.21

Minimum discharge, 1.0 ft^3/s July 21, gage height, 2.37 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3.6	5.6	8.3	6.7	5.9	7.1	12	31	9.8	7.4	13	2.8
2	3.3	7.5	7.8	6.6	9.6	7.1	12	87	8.4	5.5	10	2.6
3	3.0	7.4	8.9	6.0	13	7.1	16	48	9.7	4.1	8.2	2.5
4	2.8	6.1	11	5.4	8.4	7.7	16	28	16	15	7.0	2.2
5	2.6	5.6	13	5.1	7.9	8.5	13	21	12	12	6.2	2.1
6	2.6	5.3	15	5.1	6.1	9.8	11	17	14	5.8	5.4	3.5
7	4.6	4.8	11	6.0	5.5	11	14	15	14	4.5	4.6	3.1
8	4.0	4.7	9.6	5.7	5.6	12	14	16	9.9	3.7	3.8	2.7
9	3.3	4.4	8.3	5.4	4.9	12	13	13	8.0	3.2	3.2	2.5
10	3.1	5.3	7.5	6.3	4.4	11	25	12	7.7	2.9	3.1	2.3
11	3.1	8.2	6.6	7.8	4.6	9.3	23	10	6.6	2.8	7.4	2.2
12	3.1	11	6.5	8.0	4.4	8.0	21	9.1	5.8	2.5	11	2.1
13	3.0	9.5	5.4	6.6	3.9	7.2	20	8.3	4.9	2.2	7.4	2.1
14	3.2	7.5	5.2	5.8	4.5	7.6	53	8.0	4.4	2.4	5.9	2.1
15	3.3	6.5	6.1	5.3	6.3	7.4	58	8.0	4.4	2.2	4.8	2.1
16	3.1	5.9	12	4.8	6.5	6.9	28	7.4	4.1	1.9	4.1	3.9
17	3.1	5.4	10	4.5	8.3	6.8	23	6.8	3.5	1.8	3.7	3.7
18	3.1	5.1	8.8	4.1	8.0	6.9	22	6.4	3.1	1.8	3.3	4.1
19	3.0	5.1	9.1	3.7	7.6	9.1	20	9.8	2.8	1.7	3.1	5.4
20	3.4	11	12	3.3	9.4	9.1	22	16	2.7	1.7	2.8	6.2
21	3.5	10	11	2.8	10	9.0	19	12	2.5	2.0	2.5	12
22	3.4	8.5	9.2	3.1	10	9.0	16	12	2.2	2.1	4.0	10
23	3.3	9.3	9.4	4.1	14	9.0	14	13	2.0	4.2	3.3	8.5
24	3.1	12	13	4.8	12	9.0	12	11	1.9	2.7	3.0	6.7
25	3.3	9.5	16	5.4	10	9.0	10	11	1.8	2.2	2.9	5.5
26	3.4	8.3	15	4.9	9.0	10	9.2	12	1.6	2.0	3.3	4.9
27	3.4	7.3	12	4.0	8.0	11	8.6	9.9	4.3	1.8	3.3	4.4
28	3.4	6.9	12	3.4	7.2	26	10	8.9	19	1.9	3.1	4.4
29	3.6	9.2	11	3.5	---	21	12	10	12	6.9	2.6	4.0
30	3.7	9.0	9.1	6.5	---	16	23	11	9.7	6.1	2.7	3.9
31	3.7	---	8.0	7.2	---	13	---	11	---	6.7	3.1	---
TOTAL	102.1	221.9	307.8	161.9	215.0	313.6	569.8	499.6	208.8	123.7	151.8	124.5
MEAN	3.29	7.40	9.93	5.22	7.68	10.1	19.0	16.1	6.96	3.99	4.90	4.15
MAX	4.6	12	16	8.0	14	26	58	87	19	15	13	12
MIN	2.6	4.4	5.2	2.8	3.9	6.8	8.6	6.4	1.6	1.7	2.5	2.1
CFSM	.18	.41	.55	.29	.43	.56	1.06	.89	.39	.22	.27	.23
IN.	.21	.46	.64	.33	.44	.65	1.18	1.03	.43	.26	.31	.26

CAL YR 1982 TOTAL 4348.38 MEAN 11.9 MAX 199 MIN .78 CFSM .66 IN 8.99
WTR YR 1983 TOTAL 3000.50 MEAN 8.22 MAX 87 MIN 1.6 CFSM .46 IN 6.20

04160600 BELLE RIVER AT MEMPHIS, MI

LOCATION.--Lat 42°54'03", long 82°46'09", in NW1/4 SE1/4 sec.35, T.6 N., R.14 E., St. Clair County, Hydrologic Unit 04090001, on right bank, at downstream side of bridge on State Highway 19 at Memphis.

DRAINAGE AREA.--151 mi^2.

PERIOD OF RECORD.--October 1962 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Altitude of gage is 720 ft from topographic map (nearest 5 ft).

REMARKS.--Records good except those for January, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--21 years, 85.6 ft^3/s, 7.70 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,520 ft^3/s Apr. 19, 1975, gage height, 8.96 ft; minimum, 2.3 ft^3/s Sept. 6, 10, 1978; minimum gage height, 1.17 ft Sept. 6, 1978.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of April 1947, reached a stage of about 9 ft, from information by local residents.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 600 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Apr. 15	1600	734	4.99	May 2	2100	*1,270	*6.51

Minimum discharge, 7.4 ft^3/s Sept. 15; minimum gage height, 1.37 ft July 17, 18, 19, 20, 21.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	12	16	36	43	31	44	105	365	69	33	187	13
2	12	19	33	40	55	44	88	980	62	26	169	12
3	13	24	31	36	118	45	92	963	59	22	84	11
4	12	29	39	32	99	47	118	573	136	20	48	10
5	10	26	53	30	76	49	110	319	167	19	34	10
6	11	23	73	29	61	54	88	203	152	32	26	10
7	11	21	67	28	42	64	84	152	178	24	22	12
8	11	20	51	27	32	101	107	141	135	20	19	14
9	17	19	41	26	26	115	109	144	86	18	16	10
10	16	17	33	26	25	96	321	119	63	15	14	11
11	17	20	29	31	24	75	327	89	52	14	66	10
12	14	25	33	36	23	59	265	74	45	14	408	8.2
13	14	35	30	41	21	49	199	66	38	15	165	9.0
14	14	34	26	34	20	45	430	60	33	14	74	8.2
15	14	27	26	31	22	44	668	58	32	12	44	7.8
16	14	23	47	29	28	42	541	56	28	12	31	9.6
17	14	20	61	26	43	39	318	52	25	9.9	24	12
18	14	18	63	24	51	37	243	47	23	9.5	20	15
19	13	17	48	22	47	42	271	49	21	12	18	14
20	14	21	60	19	51	56	300	113	19	10	17	14
21	14	27	67	17	61	61	292	168	18	12	14	19
22	13	36	57	20	66	47	223	173	17	12	14	40
23	14	33	51	23	113	47	155	198	16	16	16	35
24	14	37	96	27	128	48	116	139	15	18	16	26
25	15	43	152	30	93	51	91	100	13	17	14	20
26	14	37	154	27	65	46	77	91	12	14	13	16
27	14	30	108	24	54	79	66	85	13	12	14	14
28	14	28	96	20	46	318	60	70	22	11	13	14
29	14	30	91	21	---	320	67	63	45	19	13	13
30	14	35	68	33	---	212	140	68	46	103	12	12
31	14	---	48	32	---	136	---	74	---	103	12	---
TOTAL	421	790	1868	884	1521	2512	6071	5852	1640	688.4	1637	429.8
MEAN	13.6	26.3	60.3	28.5	54.3	81.0	202	189	54.7	22.2	52.8	14.3
MAX	17	43	154	43	128	320	668	980	178	103	408	40
MIN	10	16	26	17	20	37	60	47	12	9.5	12	7.8
CFSM	.09	.17	.40	.19	.36	.54	1.34	1.25	.36	.15	.35	.10
IN.	.10	.19	.46	.22	.37	.62	1.50	1.44	.40	.17	.40	.11

CAL YR 1982 TOTAL 35097.7 MEAN 96.2 MAX 2120 MIN 4.1 CFSM .64 IN 8.65
WTR YR 1983 TOTAL 24314.2 MEAN 66.6 MAX 980 MIN 7.8 CFSM .44 IN 5.99

04160800 SASHABAW CREEK NEAR DRAYTON PLAINS, MI

LOCATION.--Lat 42°43'12", long 83°21'13", in SE1/4 sec.26, T.4 N., R.9 E., Oakland County, Hydrologic Unit 04090003, on right bank, at upstream side of culverts on Maybee Road, 1.1 mi upstream from mouth, and 2.5 mi northeast of Drayton Plains.

DRAINAGE AREA.--20.9 mi^2.

PERIOD OF RECORD.--October 1959 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Metal V-notch weir Aug. 30, 1961, to Mar. 6, 1968. Altitude of gage is 970 ft from topographic map (nearest 10 ft).

REMARKS.--Records good except those for January and February, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--24 years, 12.3 ft^3/s, 7.99 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 181 ft^3/s Oct. 1, 1981, gage height, 4.53 ft; minimum, 0.2 ft^3/s on many days during 1961, 1963, 1964, 1965, 1966; minimum gage height, 1.59 ft Aug. 1, 2, 1960.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 45 ft^3/s and maximum (*):

Date	Time	Discharge (ft³/s)	Gage height (ft)	Date	Time	Discharge (ft³/s)	Gage height (ft)
Apr. 14	2300	58	3.26	May 2	1300	*61	*3.38

Minimum discharge, 0.87 ft^3/s Aug. 28, 29, 30, Sept. 8, 9, 10; minimum gage height, 1.86 ft Sept. 8, 9, 10, 11, 12, 14, 15, 16.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3.3	4.9	17	15	7.5	13	15	35	16	7.5	8.6	1.0
2	3.0	8.6	16	14	10	13	16	55	15	6.3	5.7	.95
3	2.8	9.4	16	13	13	13	21	51	19	5.1	3.9	.95
4	2.5	7.6	19	12	11	13	20	46	33	5.3	3.3	1.0
5	2.3	6.4	22	11	10	14	18	39	27	6.5	2.9	1.1
6	2.3	5.6	26	10	9.0	17	18	35	29	4.7	2.6	1.1
7	3.9	4.9	22	11	8.1	19	18	32	31	3.7	2.3	1.1
8	5.2	4.5	20	11	7.6	19	17	37	25	3.1	1.9	.92
9	4.1	4.4	17	11	7.7	19	18	35	21	2.7	1.6	.94
10	3.9	5.7	16	12	7.5	17	27	30	18	2.4	1.4	.94
11	3.5	7.6	15	14	7.5	16	26	27	16	2.1	3.0	.98
12	3.2	12	13	13	7.5	14	23	24	15	2.0	3.7	1.0
13	3.0	12	12	11	7.6	13	23	22	14	2.0	2.6	1.1
14	2.9	11	11	10	7.8	13	43	21	13	2.1	2.2	1.0
15	2.7	9.3	12	9.5	8.2	13	50	20	12	2.3	2.0	.96
16	2.5	8.3	19	9.0	8.8	12	40	18	11	2.4	1.9	1.4
17	2.3	7.3	17	8.0	9.4	12	39	17	10	2.4	1.8	1.8
18	2.2	6.7	15	7.5	10	12	38	16	9.3	2.6	1.7	1.9
19	2.1	6.4	16	7.0	11	13	35	17	8.2	2.5	1.5	2.0
20	2.4	15	17	7.1	12	13	36	27	7.6	2.3	1.4	2.1
21	2.5	17	16	6.4	13	13	36	22	6.7	2.4	1.2	6.3
22	2.5	15	15	6.5	14	13	31	23	6.0	2.7	1.6	4.4
23	2.5	16	16	7.1	17	14	29	25	5.2	2.3	1.6	3.4
24	2.5	21	22	7.3	16	13	28	21	5.0	2.0	1.3	3.1
25	2.4	17	27	7.4	15	12	25	19	4.7	1.8	1.2	2.8
26	2.3	15	27	7.0	14	12	23	19	4.3	1.6	1.2	2.5
27	2.6	14	23	6.6	13	15	21	17	4.3	1.4	1.2	2.3
28	2.7	14	23	6.0	13	25	22	16	11	1.3	.99	2.3
29	2.8	18	21	5.8	---	22	25	16	11	3.5	.90	2.3
30	2.7	18	18	6.2	---	19	29	16	8.3	3.6	.96	2.3
31	3.2	---	16	6.6	---	17	---	16	---	3.5	1.2	---
TOTAL	88.8	322.6	562	289.0	296.2	463	810	814	416.6	96.1	69.35	55.94
MEAN	2.86	10.8	18.1	9.32	10.6	14.9	27.0	26.3	13.9	3.10	2.24	1.86
MAX	5.2	21	27	15	17	25	50	55	33	7.5	8.6	6.3
MIN	2.1	4.4	11	5.8	7.5	12	15	16	4.3	1.3	.90	.92
CFSM	.14	.52	.87	.45	.51	.71	1.29	1.26	.67	.15	.11	.09
IN.	.16	.57	1.00	.51	.53	.82	1.44	1.45	.74	.17	.12	.10

CAL YR 1982 TOTAL 5576.30 MEAN 15.3 MAX 85 MIN 1.4 CFSM .73 IN 9.92
WTR YR 1983 TOTAL 4283.59 MEAN 11.7 MAX 55 MIN .90 CFSM .56 IN 7.62

04160900 CLINTON RIVER NEAR DRAYTON PLAINS, MI

LOCATION.--Lat 42°39'37", long 83°23'25", in NE1/4 sec.21, T.3 N., R.9 E., Oakland County, Hydrologic Unit 04090003, on left bank at downstream side of bridge on State Highway 59, 1.0 mi downstream from State fish hatchery, and 2.0 mi south of Drayton Plains.

DRAINAGE AREA.--79.2 mi^2.

PERIOD OF RECORD.--October 1959 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Altitude of gage is 940 ft from topographic map (nearest 10 ft). Jan. 29 to July 9, 1964, nonrecording gage at same site and datum.

REMARKS.--Records good. Some regulation and occasional diversion for lake level control at many lakes above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--24 years, 50.2 ft^3/s, 8.61 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 276 ft^3/s Mar. 12, 1974, gage height, 4.95 ft; minimum, 2.4 ft^3/s May 31, 1961; minimum gage height, 1.23 ft Jan. 4, 1961.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 135 ft^3/s Apr. 17, gage height, 3.74 ft; minimum, 6.3 ft^3/s Mar. 16, 17, 18, gage height, 2.04 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	25	9.7	71	78	44	55	54	90	55	58	45	12
2	25	24	70	74	49	54	54	115	62	30	58	12
3	21	47	78	71	50	54	43	124	66	32	38	12
4	19	46	89	67	54	54	28	127	74	33	18	12
5	19	34	100	63	56	54	30	127	90	44	19	12
6	19	32	111	61	57	56	37	130	98	50	20	11
7	22	30	109	56	58	56	42	128	101	30	22	11
8	22	25	106	55	56	58	42	129	101	30	39	11
9	21	21	102	54	55	59	52	114	95	27	34	11
10	22	23	98	47	54	60	74	102	89	15	17	10
11	19	24	95	42	53	59	69	98	67	15	19	10
12	17	48	92	40	50	58	65	92	49	13	19	10
13	17	82	82	39	48	57	64	79	43	13	20	9.7
14	15	82	74	40	46	54	82	77	42	15	22	9.7
15	14	68	71	40	45	27	102	68	38	13	20	9.1
16	13	50	82	40	46	6.7	102	48	40	12	20	10
17	12	49	81	41	46	6.3	118	49	38	12	18	9.7
18	12	46	79	42	46	6.3	126	46	33	12	15	9.1
19	11	31	79	42	48	7.5	122	46	27	11	15	9.1
20	10	34	78	41	48	15	120	46	18	11	15	11
21	9.7	41	77	38	49	63	116	55	17	11	15	11
22	9.1	42	76	38	50	79	114	98	17	10	15	10
23	9.1	56	75	38	54	78	96	95	17	10	15	13
24	12	86	76	38	55	76	77	78	13	10	14	30
25	26	68	79	38	55	69	66	75	16	10	14	48
26	8.2	66	79	39	55	62	67	91	15	10	14	21
27	8.2	66	81	40	56	60	57	87	14	9.7	13	21
28	8.2	66	82	40	56	60	56	74	17	9.7	13	20
29	7.8	68	82	40	---	58	58	45	17	11	13	19
30	7.8	70	82	44	---	57	74	68	42	11	13	12
31	7.8	---	81	43	---	55	---	74	---	12	13	---
TOTAL	468.9	1434.7	2617	1469	1439	1573.8	2207	2675	1411	590.4	645	416.4
MEAN	15.1	47.8	84.4	47.4	51.4	50.8	73.6	86.3	47.0	19.0	20.8	13.9
MAX	26	86	111	78	58	79	126	130	101	58	58	48
MIN	7.8	9.7	70	38	44	6.3	28	45	13	9.7	13	9.1
CFSM	.19	.60	1.07	.60	.65	.64	.93	1.09	.59	.24	.26	.18
IN.	.22	.67	1.23	.69	.68	.74	1.04	1.26	.66	.28	.30	.20

CAL YR 1982 TOTAL 20236.0 MEAN 55.4 MAX 195 MIN 7.8 CFSM .70 IN 9.50
WTR YR 1983 TOTAL 16947.2 MEAN 46.4 MAX 130 MIN 6.3 CFSM .59 IN 7.96

04161100 GALLOWAY CREEK NEAR AUBURN HEIGHTS, MI

LOCATION.--Lat 42°40'02", long 83°12'02", in SE1/4 sec.18, T.3 N., R.11 E., Oakland County, Hydrologic Unit 04090003, on right bank 12 ft downstream from wooden bridge on Oakland University property, and 2.7 mi northeast of Auburn Heights.

DRAINAGE AREA.--17.9 mi^2.

PERIOD OF RECORD.--October 1959 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 820.78 ft National Geodetic Vertical Datum of 1929 (levels by Johnson & Anderson, Inc.).

REMARKS.--Records good. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--24 years, 10.0 ft^3/s, 7.59 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 368 ft^3/s June 25, 1968, gage height, 6.27 ft; minimum, 0.01 ft^3/s on many days during July and August, 1964; minimum gage height, 0.82 ft Aug. 1, 1960.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 90 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Apr. 14	1900	125	4.40	May 2	0500	*182	*5.16

Minimum discharge, 0.95 ft^3/s Aug. 29, Sept. 3, 4, 5, 6, 9, 10, 11, 12, gage height, 1.44 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.6	3.6	13	11	7.5	8.6	13	43	10	4.8	18	1.1
2	2.2	13	12	9.7	23	8.4	16	151	9.1	4.0	8.0	1.1
3	2.0	14	12	8.2	19	8.3	22	115	13	3.1	5.9	1.1
4	1.8	8.2	18	5.9	14	8.7	20	71	21	10	4.3	1.1
5	1.6	6.0	23	5.8	11	9.2	17	45	18	7.0	3.2	1.1
6	1.6	4.5	23	5.7	8.7	13	17	31	31	4.3	2.0	1.2
7	1.8	3.7	18	5.6	7.5	14	24	25	27	3.2	1.8	1.1
8	1.7	3.2	15	5.6	6.3	15	20	37	19	2.6	1.6	1.1
9	1.6	2.8	13	5.7	5.7	15	23	28	14	2.2	1.2	1.1
10	1.7	4.3	11	6.0	4.5	13	50	22	12	2.0	1.3	1.0
11	1.7	10	10	7.0	4.3	12	34	18	9.9	1.8	5.2	1.0
12	1.6	20	8.5	8.4	3.7	11	24	16	8.3	1.6	3.6	1.1
13	1.5	16	7.2	7.0	3.3	9.8	27	14	7.1	1.5	2.4	1.1
14	1.4	12	6.5	6.8	4.4	9.4	87	13	6.1	1.5	1.9	1.1
15	1.4	9.4	7.3	6.5	5.3	8.8	91	12	7.1	1.4	1.8	1.1
16	1.4	7.3	25	5.7	6.5	8.2	55	11	5.6	1.4	1.6	2.7
17	1.3	6.0	17	4.7	11	7.8	43	10	4.7	1.8	1.5	1.7
18	1.3	5.0	14	4.2	9.3	7.7	40	9.9	4.0	1.4	1.4	1.4
19	1.7	4.5	14	3.3	11	9.8	34	12	3.5	2.2	1.3	1.7
20	2.0	28	15	2.9	12	9.2	33	13	3.1	1.4	1.2	1.4
21	1.6	20	14	2.7	12	9.0	30	12	2.7	2.3	1.2	5.2
22	1.3	16	12	2.8	13	9.1	23	22	2.4	2.2	1.5	1.5
23	1.3	21	12	4.5	18	8.7	19	22	2.2	1.4	1.2	1.3
24	1.3	24	14	5.5	15	8.7	16	16	2.0	1.3	1.2	1.2
25	1.3	17	25	5.4	13	8.8	14	15	1.9	1.2	1.1	1.2
26	1.4	14	23	4.3	11	9.1	13	14	1.7	1.2	1.2	1.2
27	1.3	12	19	3.8	9.7	15	12	12	2.0	1.2	1.1	1.2
28	1.4	14	20	3.4	9.1	28	14	11	12	1.3	1.1	1.2
29	1.5	19	17	3.4	---	23	15	13	7.4	5.5	1.1	1.2
30	1.4	15	14	11	---	18	44	12	5.8	2.4	1.5	1.2
31	1.5	---	12	8.5	---	15	---	11	---	6.1	1.4	---
TOTAL	49.2	353.5	464.5	181.0	278.8	359.3	890	856.9	273.6	85.3	82.8	41.7
MEAN	1.59	11.8	15.0	5.84	9.96	11.6	29.7	27.6	9.12	2.75	2.67	1.39
MAX	2.6	28	25	11	23	28	91	151	31	10	18	5.2
MIN	1.3	2.8	6.5	2.7	3.3	7.7	12	9.9	1.7	1.2	1.1	1.0
CFSM	.09	.66	.84	.33	.56	.65	1.66	1.54	.51	.15	.15	.08
IN.	.10	.73	.97	.38	.58	.75	1.85	1.78	.57	.18	.17	.09

CAL YR 1982 TOTAL 4513.8 MEAN 12.4 MAX 175 MIN 1.2 CFSM .69 IN 9.38
WTR YR 1983 TOTAL 3916.6 MEAN 10.7 MAX 151 MIN 1.0 CFSM .60 IN 8.14

04161540 PAINT CREEK AT ROCHESTER, MI

LOCATION.--Lat 42°41'18", long 83°08'35", in NW1/4 SE1/4 sec.10, T.3 N., R.11 E., Oakland County, Hydrologic Unit 04090003, on right bank, at upstream side of bridge on Ludlow Street in Rochester, and 1.5 mi upstream from mouth.

DRAINAGE AREA.--70.9 mi^2.

PERIOD OF RECORD.--October 1959 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 755.11 ft National Geodetic Vertical Datum of 1929.

REMARKS.--Records good. Occasional regulation by Lake Orion. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--24 years, 51.5 ft^3/s, 9.86 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 918 ft^3/s Feb. 1, 1968; maximum gage height, 5.95 ft Feb. 10, 1965, backwater from ice; minimum discharge, 1.2 ft^3/s Aug. 19, 1974, caused by regulation due to bridge construction; minimum gage height, 1.26 ft Sept. 16, 1960.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 200 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Apr. 15	0500	258	3.05	July 4	1500	213	2.87
May 2	1230	*518	*3.87	Aug. 1	0100	210	2.87

Minimum discharge, 10 ft^3/s Sept. 10, gage height, 1.48 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	37	33	33	51	39	43	57	124	62	35	73	18
2	35	42	33	51	60	42	62	418	58	24	40	17
3	34	34	37	49	62	42	86	242	69	19	31	17
4	33	24	53	48	46	44	77	185	105	40	29	15
5	32	20	66	47	43	45	66	157	83	31	28	14
6	32	18	79	46	40	55	66	146	109	22	29	16
7	36	17	67	47	39	61	78	129	103	20	25	14
8	35	17	60	46	38	61	73	144	90	18	22	12
9	34	17	55	45	37	61	77	112	80	17	24	11
10	33	21	51	49	37	55	120	83	72	16	22	11
11	33	34	49	52	37	51	97	77	63	15	34	11
12	31	48	46	50	36	47	91	69	56	15	29	12
13	31	37	45	48	36	45	94	56	51	15	24	12
14	31	27	41	47	36	44	181	56	40	16	21	12
15	30	23	46	48	36	38	235	57	41	16	22	12
16	28	20	77	45	37	37	177	54	40	15	22	21
17	28	19	58	41	46	36	166	53	38	15	19	16
18	27	19	50	38	42	27	158	52	36	15	18	16
19	28	19	50	35	43	33	146	60	35	29	18	17
20	30	56	52	35	47	31	142	74	35	26	18	18
21	30	46	48	35	47	30	136	67	33	25	18	31
22	27	34	44	35	49	32	112	82	33	29	20	22
23	27	40	45	36	62	34	52	94	32	20	20	20
24	26	47	54	37	55	35	44	102	31	22	23	19
25	26	34	71	38	51	35	44	103	30	21	20	20
26	26	30	69	37	46	36	46	97	30	24	20	20
27	26	27	60	36	44	46	49	91	31	31	18	20
28	25	31	66	35	43	69	57	79	60	28	18	20
29	26	42	62	34	---	63	65	80	44	52	17	20
30	26	36	55	44	---	58	109	73	37	39	18	20
31	26	---	52	41	---	58	---	68	---	38	20	---
TOTAL	929	912	1674	1326	1234	1394	2963	3284	1627	748	760	504
MEAN	30.0	30.4	54.0	42.8	44.1	45.0	98.8	106	54.2	24.1	24.5	16.8
MAX	37	56	79	52	62	69	235	418	109	52	73	31
MIN	25	17	33	34	36	27	44	52	30	15	17	11
CFSM	.42	.43	.76	.60	.62	.64	1.39	1.50	.76	.34	.35	.24
IN.	.49	.48	.88	.70	.65	.73	1.55	1.72	.85	.39	.40	.26

CAL YR 1982 TOTAL 22270 MEAN 61.0 MAX 407 MIN 14 CFSM .86 IN 11.68
WTR YR 1983 TOTAL 17355 MEAN 47.5 MAX 418 MIN 11 CFSM .67 IN 9.11

04161580 STONY CREEK NEAR ROMEO, MI

LOCATION.--Lat 42°48'03", long 83°05'25", in SW1/4 sec.31, T.5 N., R.12 E., Macomb County, Hydrologic Unit 04090003, on right bank at upstream side of bridge on Romeo Road, and 4.0 mi west of Romeo.

DRAINAGE AREA.--25.6 mi^2.

PERIOD OF RECORD.--October 1964 to current year.

GAGE.--Water-stage recorder. Datum of gage is 861.64 ft National Geodetic Vertical Datum of 1929.

REMARKS.--Records good except those for January, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--19 years, 17.2 ft^3/s, 9.12 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 290 ft^3/s Apr. 19, 1975, gage height, 5.19 ft; minimum, 0.92 ft^3/s Oct. 5, 9, 1967; minimum gage height, 1.28 ft July 27, 28, 1965.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 98 ft^3/s May 2, gage height, 3.57 ft, no peak above base of 100 ft^3/s; minimum, 1.4 ft^3/s Sept. 10, gage height, 1.36 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	8.5	7.8	17	16	9.8	13	19	39	20	7.0	11	4.2
2	5.7	17	16	16	14	12	20	86	18	6.5	8.9	3.5
3	5.4	17	16	14	16	13	27	85	21	5.9	6.7	3.3
4	4.0	12	18	12	16	14	25	72	32	7.1	7.4	3.0
5	6.7	10	20	11	14	15	24	68	29	10	6.9	2.9
6	6.6	9.5	22	12	11	19	22	61	32	8.0	8.0	3.0
7	8.5	8.8	17	12	11	21	25	52	31	6.4	7.1	3.5
8	8.5	8.4	16	12	10	20	23	52	29	5.4	5.7	3.2
9	6.4	8.1	13	11	10	20	24	47	27	5.1	6.7	3.0
10	5.7	8.2	14	12	10	18	34	34	28	4.8	6.4	2.4
11	5.7	19	13	14	9.5	15	30	25	21	4.2	11	2.8
12	5.6	22	11	13	9.5	12	29	19	16	3.6	11	2.7
13	8.4	16	10	12	9.2	11	29	16	13	3.5	6.7	3.0
14	8.0	12	13	11	8.8	11	43	15	12	3.2	5.8	2.8
15	7.9	11	15	10	9.0	11	51	14	11	3.2	9.3	2.5
16	4.8	15	27	9.3	9.5	9.5	49	12	10	3.0	8.1	3.9
17	3.1	14	23	8.7	10	9.2	45	11	8.6	2.7	5.6	4.0
18	3.3	14	19	8.1	11	9.1	42	11	6.4	2.7	3.9	3.9
19	6.6	14	20	7.7	12	12	41	14	5.8	2.9	3.6	3.9
20	7.7	24	23	7.2	14	11	43	30	5.8	3.3	3.7	3.7
21	8.4	24	20	6.7	15	10	43	24	5.4	4.5	4.1	8.0
22	7.6	19	18	6.3	17	10	39	25	4.5	6.3	4.7	5.2
23	7.1	19	20	8.0	22	9.5	33	28	4.4	4.9	4.4	4.0
24	6.5	23	25	9.0	18	9.5	28	24	4.2	4.8	3.5	3.5
25	6.1	17	28	9.0	16	11	23	28	4.2	4.4	3.0	3.5
26	6.2	15	26	9.0	14	15	26	29	4.2	3.6	2.8	3.4
27	4.4	14	22	8.8	13	19	24	25	4.3	3.1	2.7	3.4
28	4.1	13	23	8.5	13	26	25	22	12	3.2	2.7	3.4
29	4.3	19	21	8.3	---	25	27	22	11	5.0	2.7	3.2
30	4.8	17	16	11	---	22	32	22	7.3	5.2	2.9	3.2
31	5.1	---	17	10	---	21	---	22	---	5.9	5.0	---
TOTAL	191.7	447.8	579	323.6	352.3	453.8	945	1034	438.1	149.4	182.0	106.0
MEAN	6.18	14.9	18.7	10.4	12.6	14.6	31.5	33.4	14.6	4.82	5.87	3.53
MAX	8.5	24	28	16	22	26	51	86	32	10	11	8.0
MIN	3.1	7.8	10	6.3	8.8	9.1	19	11	4.2	2.7	2.7	2.4
CFSM	.24	.58	.73	.41	.49	.57	1.23	1.31	.57	.19	.23	.14
IN.	.28	.65	.84	.47	.51	.66	1.37	1.50	.64	.22	.26	.15

CAL YR 1982 TOTAL 6156.4 MEAN 16.9 MAX 125 MIN 2.6 CFSM .66 IN 8.95
WTR YR 1983 TOTAL 5202.7 MEAN 14.3 MAX 86 MIN 2.4 CFSM .56 IN 7.56

04161790 STONY LAKE NEAR WASHINGTON, MI

LOCATION.--Lat 42°42'58", long 83°05'58", in SE1/4 sec.31, T.4 N., R.12 E., Macomb County, Hydrologic Unit 04090003, on left bank 1,000 ft east of bridge over dam on Stony Creek, and 2.7 mi west of Washington.

DRAINAGE AREA.--68.0 mi^2.

PERIOD OF RECORD.--February 1963 to current year.

REVISED RECORDS.--WDR MI-77-1: 1976.

GAGE.--Water-stage recorder. Datum of gage is 790.00 ft National Geodetic Vertical Datum of 1929 (levels by Huron-Clinton Metropolitan Authority). Gage readings have been converted to elevations NGVD.

REMARKS.--Reservoir is formed by an earthfill dam with concrete spillway completed in 1962. The spillway section includes a drum gate with minimum crest elevation of 796 ft, maximum of 802 ft; and 2 sluices, one on each side, with valve controls capable of draining lake. Total capacity (new capacity table put into use Oct. 1, 1973), 4,649 acre-ft at elevation of 802 ft. The reservoir began filling February 1963. Lake is used for recreational purposes.

EXTREMES FOR PERIOD OF RECORD.--Maximum contents, 5,495 acre-ft May 17, 18, 1974, Apr. 20, 1975, elevation, 803.6 ft; minimum recorded, 1,758 acre-ft Nov. 21, 1967, elevation, 794.7 ft.

EXTREMES FOR CURRENT YEAR.--Maximum contents, 5,081 acre-ft May 2, elevation, 802.83 ft; minimum, 3,812 acre-ft Jan. 21, 22, elevation, 800.28 ft.

MONTHEND ELEVATION AND CONTENTS AT 2400, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

Date	Elevation (feet)	Contents (acre-feet)	Change in contents during month Acre-foot	Change in contents during month Equivalent in ft³/s
Sept. 30	802.2	4753	--	--
Oct. 31	802.2	4753	0	0
Nov. 30	800.5	3913	-840	-14.1
Dec. 31	800.5	3913	0	0
CAL YR 1982	--	--	+496	+0.7
Jan. 31	800.3	3821	-92	-1.5
Feb. 28	800.4	3867	+46	+0.8
Mar. 31	801.8	4549	+682	+11.1
Apr. 30	802.4	4857	+308	+5.2
May 31	802.4	4857	0	0
June 30	802.2	4753	-104	-1.7
July 31	802.1	4701	-52	-0.8
Aug. 31	802.1	4701	0	0
Sept. 30	802.1	4701	0	0
WTR YR 1983	--	--	-52	-0.1

04161800 STONY CREEK NEAR WASHINGTON, MI

LOCATION.--Lat 42°42'55", long 83°05'31", in SW1/4 sec.31, T.4 N., R.12 E., Macomb County, Hydrologic Unit 04090003, on left bank at downstream side of bridge on Mt. Vernon Road, 500 ft downstream from Stony Lake Dam, and 2.9 mi west of Washington.

DRAINAGE AREA.--68.2 mi^2.

PERIOD OF RECORD.--July 1958 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 772.59 ft National Geodetic Vertical Datum of 1929 (levels by Huron-Clinton Metropolitan Authority).

REMARKS.--Records good except those below 13 ft^3/s, which are fair. Occasional diurnal fluctuation caused by mills above station prior to February 1963; occasional regulation by Stony Lake since (station 04161790). Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--25 years, 41.8 ft^3/s, 8.32 in/yr, adjusted for storage since 1963.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 427 ft^3/s Feb. 2, 1968, gage height, 5.86 ft; maximum gage height, 6.71 ft Mar. 6, 1959, backwater from ice; minimum discharge, 0.9 ft^3/s July 10, 1963; minimum gage height, 1.79 ft Apr. 6, 1979; minimum daily discharge, 1.3 ft^3/s July 31, Aug. 1, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 244 ft^3/s May 3, gage height, 4.63 ft; minimum, 1.3 ft^3/s Sept. 14, 15, gage height, 2.01 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	21	18	54	44	32	37	50	98	50	31	33	6.7
2	19	28	51	41	35	36	51	206	47	29	31	6.4
3	18	31	51	38	41	35	54	237	51	24	29	5.8
4	16	30	56	35	41	35	57	214	72	21	26	4.9
5	16	26	60	33	38	37	59	188	76	26	26	4.7
6	16	21	64	33	37	43	59	159	86	21	26	7.4
7	16	19	62	34	37	50	61	142	90	18	22	7.4
8	18	53	59	33	34	28	63	147	81	15	18	4.1
9	17	81	52	33	33	14	63	123	72	17	17	3.8
10	16	76	47	36	31	18	81	110	66	17	14	3.9
11	15	61	44	38	30	10	88	73	61	11	21	5.4
12	14	64	38	39	28	7.1	85	55	50	14	22	4.9
13	13	63	36	38	28	11	84	56	44	13	21	6.0
14	13	55	33	37	28	21	109	53	38	13	19	2.9
15	14	80	33	37	28	28	129	52	33	13	17	1.6
16	13	97	49	34	30	29	129	46	31	12	16	2.6
17	11	84	53	33	33	28	146	38	28	11	16	4.5
18	11	90	52	30	34	28	124	36	24	8.5	17	5.6
19	11	99	50	27	36	32	112	38	18	11	15	10
20	12	98	52	26	36	35	106	47	16	14	14	10
21	13	84	51	24	38	41	74	52	15	17	10	17
22	13	74	48	25	41	34	80	62	14	26	13	15
23	13	68	47	28	48	34	90	72	13	25	10	14
24	13	71	50	28	52	37	87	70	13	23	8.0	12
25	14	65	60	29	50	36	68	66	10	21	7.1	9.1
26	14	61	66	28	46	37	61	64	10	16	6.9	9.4
27	14	55	64	28	42	40	43	62	14	15	7.1	10
28	14	52	62	27	38	33	43	57	29	16	7.4	9.7
29	14	56	61	27	---	34	51	56	30	17	6.4	10
30	14	55	53	30	---	47	75	55	30	19	7.6	10
31	14	---	47	31	---	51	---	53	---	21	12	---
TOTAL	450	1815	1605	1004	1025	986.1	2382	2787	1212	555.5	515.5	224.8
MEAN	14.5	60.5	51.8	32.4	36.6	31.8	79.4	89.9	40.4	17.9	16.6	7.49
MAX	21	99	66	44	52	51	146	237	90	31	33	17
MIN	11	18	33	24	28	7.1	43	36	10	8.5	6.4	1.6
MEAN +	14.5	46.4	51.8	30.9	37.4	42.9	84.6	89.9	38.7	17.1	16.6	7.49
CFSM +	.21	.68	.76	.45	.55	.63	1.24	1.32	.57	.25	.24	.11
IN +	.25	.76	.88	.52	.57	.73	1.38	1.52	.63	.29	.28	.12

CAL YR 1982 TOTAL 17126.8 MEAN 46.9 MAX 261 MIN 5.0 MEAN + 47.6 CFSM + .70 IN + 9.48
WTR YR 1983 TOTAL 14561.9 MEAN 39.9 MAX 237 MIN 1.6 MEAN + 39.8 CFSM + .58 IN + 7.92

+ Adjusted for change in contents in Stony Lake.

04161820 CLINTON RIVER AT STERLING HEIGHTS, MI

LOCATION.--Lat 42°36'52", long 83°01'36", in NE1/4 SW1/4 sec.3, T.2 N., R.12 E., Macomb County, Hydrologic Unit 04090003, on right bank at upstream side of bridge on Riverland Road at Sterling Heights.

DRAINAGE AREA.--309 mi^2.

PERIOD OF RECORD.--October 1978 to December 1982 (discontinued).

GAGE.--Water-stage recorder. Altitude of gage is 625 ft from topographic map (nearest 5 ft).

REMARKS.--Records good. Several observations of water temperature were made during the year.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,500 ft^3/s Apr. 14, 1979; minimum, 65 ft^3/s Sept. 7, 10, 1979, gage height, 6.77 ft.

EXTREMES FOR CURRENT YEAR.--Maximum daily discharge during period October to December, 1982, 430 ft^3/s Nov. 20, Dec. 16, no peak above base of 900 ft^3/s; maximum gage height recorded, 10.07 ft Nov. 20; minimum discharge, 118 ft^3/s Oct. 4, 5, 6, 7, gage height, 7.30 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	176	180	260									
2	178	299	280									
3	151	287	290									
4	122	204	320									
5	121	166	390									
6	120	150	370									
7	127	140	340									
8	142	168	320									
9	142	188	300									
10	157	213	280									
11	158	203	270									
12	157	327	240									
13	152	233	310									
14	153	180	280									
15	154	173	320									
16	147	190	430									
17	135	178	370									
18	138	172	310									
19	141	190	320									
20	150	430	330									
21	144	332	310									
22	142	258	295									
23	140	271	278									
24	138	402	311									
25	139	287	383									
26	146	235	358									
27	143	224	339									
28	141	240	342									
29	148	280	323									
30	149	260	299									
31	151	---	280									
TOTAL	4502	7060	9848	---	---	---	---	---	---	---	---	---
MEAN	145	235	318	---	---	---	---	---	---	---	---	---
MAX	178	430	430	---	---	---	---	---	---	---	---	---
MIN	120	140	240	---	---	---	---	---	---	---	---	---
CFSM	.47	.76	1.03	---	---	---	---	---	---	---	---	---
IN.	.54	.85	1.19	---	---	---	---	---	---	---	---	---

CAL YR 1982 TOTAL 103673 MEAN 284 MAX 1380 MIN 81 CFSM .92 IN 12.48

04162010 RED RUN NEAR WARREN, MI

LOCATION.--Lat 42°31'46", long 83°04'07", in SE1/4 NE1/4 sec.6, T.1 N., R.12 E., Macomb County, Hydrologic Unit 04090003, on left bank at upstream side of bridge on Ryan Road, and 1.0 mi northwest of Warren.

DRAINAGE AREA.--Indeterminate.

PERIOD OF RECORD.--October 1979 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 620 ft, from topographic map.

REMARKS.--Records fair except those for period of no gage-height record, Aug. 31 to Sept. 30, which are poor. Diversion from Big Beaver Creek basin via Henry-Graham Drain started in 1976, is ongoing and increasing with further development of new drains. Several observations of water temperature were made during the year. Gage-height telemark at station.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,940 ft^3/s Oct. 1, 1981, gage height, 30.2 ft, from floodmark; minimum daily, 0.30 ft^3/s Sept. 11, 1983.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 1,100 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Apr. 14	1530	1,400	17.09	June 28	1145	1,260	16.11
Apr. 30	1415	1,100	15.09	July 29	1145	1,680	19.18
May 2	0100	*2,150	*22.91				

Minimum daily discharge, 0.30 ft^3/s Sept. 11.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3.0	70	13	3.5	1.7	5.7	12	168	5.5	58	300	6.0
2	2.3	275	9.3	3.3	77	5.4	42	1050	2.8	30	80	1.3
3	1.9	27	20	2.9	14	7.0	46	192	23	6.1	17	1.2
4	1.7	4.6	86	2.3	3.7	12	24	68	29	52	10	1.0
5	1.6	2.0	92	3.0	2.3	6.2	17	28	9.3	24	6.8	.92
6	1.6	1.7	42	2.2	1.6	36	55	16	141	9.3	4.0	2.5
7	10	1.2	17	4.0	1.0	24	129	14	37	5.4	3.0	2.3
8	3.6	1.0	11	2.6	.80	29	37	133	15	4.8	2.2	1.0
9	2.8	4.3	9.7	2.1	.60	19	227	24	9.0	2.4	2.0	.65
10	5.9	15	7.5	9.3	.54	11	221	16	8.6	2.2	5.6	.50
11	3.6	51	6.4	7.5	.47	7.2	60	9.2	5.5	2.0	105	.30
12	2.7	85	4.8	4.3	.43	5.1	34	7.2	4.5	1.9	15	.45
13	2.2	17	4.1	2.5	.39	4.5	86	6.3	5.0	2.0	3.6	.45
14	1.5	7.1	4.5	2.2	.79	5.9	576	9.5	5.1	11	2.3	.40
15	1.0	5.4	33	2.0	1.8	5.3	143	7.3	17	8.0	1.7	.35
16	.75	4.3	173	1.8	3.3	5.1	39	5.5	12	4.0	1.8	20
17	.70	3.1	26	1.6	12	5.5	105	5.9	5.0	2.3	1.8	6.0
18	.72	2.5	14	1.3	2.7	8.7	63	3.9	4.8	70	1.8	2.0
19	.74	2.7	54	1.1	9.1	34	48	64	5.2	360	1.7	4.5
20	5.6	243	37	1.1	5.6	9.4	43	18	5.5	18	1.7	7.0
21	3.8	37	17	1.4	5.0	8.6	29	6.3	6.8	56	2.0	150
22	2.5	16	12	5.7	15	8.2	20	117	6.3	40	2.5	25
23	1.7	92	18	20	34	8.0	15	35	6.2	9.8	2.2	2.8
24	1.2	60	36	5.1	7.8	8.3	12	11	6.1	6.6	2.2	1.5
25	.80	13	134	2.3	4.6	9.0	14	25	4.5	5.9	2.2	1.2
26	.56	14	28	1.2	3.5	13	15	8.6	2.4	6.5	2.0	.80
27	.77	9.1	13	.71	4.8	99	9.8	5.6	33	6.1	2.1	.76
28	.81	83	71	.57	5.7	109	46	4.0	421	6.3	1.9	.76
29	1.4	77	17	.46	---	31	22	54	21	550	1.7	.76
30	.93	21	7.6	38	---	19	438	13	76	120	85	.76
31	3.4	---	4.2	3.9	---	15	---	13	---	200	34	---
TOTAL	71.78	1245.0	1022.1	139.94	220.22	574.1	2627.8	2138.3	933.1	1680.6	704.8	243.16
MEAN	2.32	41.5	33.0	4.51	7.87	18.5	87.6	69.0	31.1	54.2	22.7	8.11
MAX	10	275	173	38	77	109	576	1050	421	550	300	150
MIN	.56	1.0	4.1	.46	.39	4.5	9.8	3.9	2.4	1.9	1.7	.30

CAL YR 1982 TOTAL 10750.18 MEAN 29.5 MAX 1180 MIN .56
WTR YR 1983 TOTAL 11600.90 MEAN 31.8 MAX 1050 MIN .30

04162900 BIG BEAVER CREEK NEAR WARREN, MI

LOCATION.--Lat 42°32'31", long 83°02'52", in NW1/4 SW1/4 sec.33, T.2 N., R.12 E., Macomb County, Hydrologic Unit 04090003, on left bank between bridges on Mound Road, 1.0 mi north of Warren, and 2.0 mi upstream from mouth.

DRAINAGE AREA.--Indeterminate since 1976. Prior to 1976, 23.5 mi^2.

PERIOD OF RECORD.--October 1958 to current year.

GAGE.--Water-stage recorder. Datum of gage is 598.80 ft Macomb County datum. Prior to Aug. 26, 1960, nonrecording gage and crest-stage gage at same site and datum.

REMARKS.--Records poor. Diversion from the basin via Henry-Graham Drain started in 1976, is ongoing and increasing with further development of new drains. Several observations of water temperature were made during the year.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,240 ft^3/s June 26, 1968, gage height, 14.45 ft; no flow on several days in June and July 1962, caused by unusual regulation above gage; minimum discharge affected by diversion since 1976.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 416 ft^3/s May 2, gage height, 9.63 ft; minimum daily, 0.02 ft^3/s Sept. 11, 15; minimum gage height, 4.78 ft Sept. 10, 11, 12, 14, 15, 16.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.22	6.2	1.9	1.2	.40	.63	1.1	38	.94	7.4	154	.24
2	.14	41	1.4	1.1	11	1.2	8.1	194	.62	4.7	48	.08
3	.11	13	1.5	.88	3.2	.57	10	42	3.4	1.0	1.1	.08
4	.11	2.1	18	.79	.80	.81	2.8	13	4.9	4.5	.65	.06
5	.09	1.3	13	.63	.50	.59	1.2	8.1	1.4	4.0	.44	.06
6	.09	1.1	13	.63	.35	3.9	12	4.0	43	1.1	.27	.16
7	1.2	.81	3.2	.80	.21	4.9	42	3.7	5.8	.45	.23	.15
8	.54	.58	1.5	.66	.17	7.5	9.7	26	1.5	.30	.15	.05
9	.21	.57	1.2	.56	.13	4.1	42	8.1	.93	.33	.13	.04
10	.45	2.4	.87	.98	.12	1.8	72	3.4	.85	.29	.37	.03
11	.25	5.3	.78	1.4	.10	1.1	19	2.1	.92	.25	21	.02
12	.14	19	.57	.92	.09	.80	7.2	1.5	.71	.22	.95	.03
13	.13	4.7	.39	.58	.09	.61	18	1.2	.70	.26	.24	.03
14	.08	1.3	.39	.48	.20	.62	98	1.7	.61	2.8	.15	.03
15	.05	.88	2.2	.43	.40	.59	39	1.7	.56	2.2	.12	.02
16	.04	.69	43	.38	1.1	.48	12	.94	.49	.51	.11	2.7
17	.04	.61	6.1	.33	2.2	.58	26	.94	.32	.27	.12	1.4
18	.04	.53	2.5	.28	1.3	2.1	22	.71	.25	25	.12	.15
19	.04	.46	7.5	.25	2.4	13	17	12	.24	95	.11	.79
20	.31	39	8.3	.24	2.6	1.9	11	4.4	.24	10	.11	2.0
21	.31	13	2.5	.25	1.8	.82	4.4	1.1	.24	20	.12	30
22	.29	3.2	1.1	1.1	3.0	.70	2.8	20	.32	17	.18	2.5
23	.23	13	1.5	4.5	13	.65	2.1	12	.38	1.1	.15	.23
24	.15	18	9.3	1.1	3.5	.64	1.5	1.5	.36	.75	.17	.10
25	.11	3.1	32	.50	1.4	.70	1.7	3.4	.38	.54	.11	.08
26	.11	2.1	11	.30	.81	1.9	1.8	1.7	.29	.32	.11	.05
27	.08	1.9	3.1	.15	.72	31	1.2	.82	6.1	.25	.14	.05
28	.06	16	19	.13	.72	41	10	.71	108	.16	.15	.05
29	.05	19	5.9	.10	---	7.2	5.0	4.4	20	94	.11	.05
30	.05	4.6	2.0	7.0	---	2.6	70	1.9	13	28	6.6	.05
31	.13	---	1.2	.90	---	1.5	---	1.1	---	55	2.7	---
TOTAL	5.85	235.43	215.90	29.55	52.31	136.49	570.6	416.12	217.45	377.70	238.91	41.28
MEAN	.19	7.85	6.96	.95	1.87	4.40	19.0	13.4	7.25	12.2	7.71	1.38
MAX	1.2	41	43	7.0	13	41	98	194	108	95	154	30
MIN	.04	.46	.39	.10	.09	.48	1.1	.71	.24	.16	.11	.02

CAL YR 1982 TOTAL 2322.63 MEAN 6.36 MAX 289 MIN .03
WTR YR 1983 TOTAL 2537.59 MEAN 6.95 MAX 194 MIN .02

04163400 PLUM BROOK AT UTICA, MI

LOCATION.--Lat 42°36'05", long 83°04'27", in SE1/4 NE1/4 sec.7, T.2 N., R.12 E., Macomb County, Hydrologic Unit 04090003, on left bank at upstream side of bridge on Ryan Road, 1.0 mi southwest of Utica.

DRAINAGE AREA.--16.5 mi^2.

PERIOD OF RECORD.--July 1965 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 619.79 ft National Geodetic Vertical Datum of 1929 (levels by Johnson & Anderson, Inc.).

REMARKS.--Records good. Occasional diversion for sprinkler irrigation. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--18 years, 13.1 ft^3/s, 10.78 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,160 ft^3/s June 26, 1968, gage height, 10.36 ft; no flow part of each day July 19, 28, 1966, Aug. 22-28, Sept. 3, 11, 1969; minimum gage height, 1.23 ft Sept. 16, 1967.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 200 ft^3/s and maximum (*):

Date	Time	Discharge (ft³/s)	Gage height (ft)	Date	Time	Discharge (ft³/s)	Gage height (ft)
Apr. 14	2000	250	6.83	May 2	0400	*478	*8.58

Minimum discharge, 0.81 ft^3/s Aug. 29; minimum gage height, 1.75 ft, Aug. 29, Sept. 3, 5.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.5	9.1	16	11	6.0	8.7	11	70	14	38	34	2.8
2	1.2	20	13	10	25	8.3	12	343	9.5	23	13	1.9
3	1.2	16	12	11	21	8.6	20	99	12	9.4	8.8	1.4
4	1.3	8.5	24	10	11	9.4	18	53	28	11	7.1	1.4
5	1.3	6.0	24	8.1	8.0	8.5	17	35	15	18	5.9	1.2
6	1.1	5.1	37	7.5	6.5	12	19	24	57	13	4.8	1.6
7	2.4	3.7	24	8.7	5.6	18	42	17	37	6.9	4.6	1.8
8	2.8	3.3	14	8.1	5.2	18	24	68	20	6.0	3.7	2.1
9	3.3	3.1	12	7.4	4.9	16	41	28	12	4.9	3.7	2.1
10	3.7	4.7	11	9.5	4.5	13	115	17	9.3	5.7	4.0	1.9
11	3.7	6.8	10	9.5	4.1	11	41	13	7.6	5.6	9.5	1.8
12	2.9	20	9.6	7.5	4.0	9.2	26	11	6.5	7.2	6.8	1.6
13	2.6	13	7.6	9.9	3.9	8.8	30	9.5	6.2	7.3	3.7	1.8
14	2.4	7.6	7.3	6.7	4.3	9.6	157	9.0	7.0	8.1	2.8	1.7
15	2.4	5.6	7.1	7.8	6.0	10	86	9.1	6.3	7.3	2.3	1.6
16	2.1	4.5	14	8.2	7.3	10	31	8.9	8.2	4.7	1.9	3.8
17	2.1	3.9	48	6.0	13	8.6	34	8.5	5.6	4.7	1.5	4.2
18	2.2	3.7	20	6.0	9.6	8.0	34	7.0	4.4	10	1.7	3.3
19	2.2	3.5	15	3.7	11	12	27	15	4.0	40	1.4	4.7
20	3.8	45	27	3.6	13	11	27	19	4.0	27	1.1	5.8
21	4.0	28	18	3.8	13	9.7	18	10	3.5	14	1.3	20
22	3.5	16	15	3.8	13	9.2	15	44	2.9	14	1.5	7.9
23	3.3	30	18	6.3	23	9.0	11	33	2.9	9.8	1.4	4.9
24	3.3	46	19	9.0	17	9.3	9.6	15	2.7	7.9	1.3	3.5
25	3.3	16	50	7.0	13	10	9.0	14	2.5	6.1	1.2	2.9
26	3.3	12	33	5.1	10	11	9.3	13	2.2	5.1	1.3	2.8
27	3.5	11	19	4.3	8.5	23	9.6	9.8	2.6	4.5	1.3	2.6
28	3.7	17	31	3.7	8.4	40	8.7	8.3	26	3.8	1.6	2.4
29	4.0	36	24	3.6	---	21	11	17	14	14	1.7	3.1
30	4.0	20	16	11	---	14	86	13	10	14	4.4	2.8
31	4.0	---	12	9.3	---	12	---	14	---	24	5.8	---
TOTAL	86.1	433.1	607.6	227.1	279.8	386.9	999.2	1055.1	342.9	375.0	145.1	101.4
MEAN	2.78	14.4	19.6	7.33	9.99	12.5	33.3	34.0	11.4	12.1	4.68	3.38
MAX	4.0	46	50	11	25	40	157	343	57	40	34	20
MIN	1.1	3.1	7.1	3.6	3.9	8.0	8.7	7.0	2.2	3.8	1.1	1.2
CFSM	.17	.87	1.19	.44	.61	.76	2.02	2.06	.69	.73	.28	.21
IN.	.19	.98	1.37	.51	.63	.87	2.25	2.38	.77	.85	.33	.23

CAL YR 1982 TOTAL 5917.37 MEAN 16.2 MAX 430 MIN .27 CFSM .98 IN 13.34
WTR YR 1983 TOTAL 5039.30 MEAN 13.8 MAX 343 MIN 1.1 CFSM .84 IN 11.36

04164000 CLINTON RIVER NEAR FRASER, MI

LOCATION.--Lat 42°34'40", long 82°57'00", in NW1/4 sec.20, T.2 N., R.13 E., Macomb County, Hydrologic Unit 04090003, on left bank 800 ft downstream from bridge on Garfield Road, 2.8 mi north of Fraser, and 4.0 mi upstream from North Branch.

DRAINAGE AREA.--444 mi^2.

PERIOD OF RECORD.--May 1947 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 577.71 ft National Geodetic Vertical Datum of 1929. Prior to Nov. 17, 1949, nonrecording gage at site 800 ft upstream at same datum.

REMARKS.--Records good except those for period of no gage-height record, Mar. 23 to Apr. 27, which are fair. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--36 years, 374 ft^3/s, 11.44 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 8,840 ft^3/s Oct. 1, 1981, gage height, 19.56 ft; minimum, 47 ft^3/s Sept. 6, 1955; minimum gage height, 4.29 ft Sept. 7, 1954.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of Apr. 5 or 6, 1947, reached a stage of 20 ft, from floodmarks, discharge, 9,000 ft^3/s.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 2,000 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Apr. 10	--	2,100	unknown	May 2	0600	*4,840	*16.58
Apr. 15	--	2,700	unknown	July 29	1600	3.010	14.64

Minimum discharge, 110 ft^3/s Sept. 12, gage height, 5.25 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	226	469	388	346	250	299	370	1320	423	387	826	165
2	235	1180	365	328	452	291	430	3870	395	378	461	143
3	210	577	383	325	528	286	510	2680	377	270	318	135
4	178	296	717	314	325	298	480	1550	613	405	286	122
5	177	226	606	306	270	290	430	1120	481	533	237	124
6	171	207	678	288	247	360	460	937	795	305	215	150
7	183	181	497	309	244	460	700	828	788	262	202	145
8	210	178	428	306	245	540	640	1060	563	242	189	131
9	188	215	402	292	233	500	1000	934	506	233	184	126
10	221	285	368	326	227	410	1500	736	485	211	182	128
11	226	287	357	369	198	350	1100	660	431	200	459	119
12	214	562	319	336	198	300	900	582	396	200	288	117
13	212	394	297	300	199	280	700	548	378	191	202	129
14	207	242	357	288	205	260	1200	499	351	237	176	126
15	207	206	364	307	234	250	2000	452	334	222	160	123
16	204	222	1090	269	278	266	1500	406	316	169	164	258
17	183	223	621	261	326	248	1200	394	251	160	161	229
18	181	204	469	227	293	222	1100	381	231	197	161	145
19	191	218	503	221	306	334	1000	500	212	785	160	186
20	223	958	578	224	318	262	920	546	197	537	156	179
21	225	726	461	232	305	242	860	395	205	334	143	680
22	195	421	411	258	325	267	760	580	194	461	145	237
23	189	495	395	332	462	250	620	681	193	238	150	176
24	182	767	502	318	361	250	520	492	193	199	134	166
25	186	422	833	307	366	240	460	500	183	183	142	151
26	193	344	701	255	332	250	430	528	175	175	142	145
27	191	329	498	230	305	400	430	489	361	180	142	153
28	194	447	656	224	297	860	459	456	1360	169	133	153
29	196	671	523	227	---	720	522	535	606	1380	129	148
30	201	456	425	322	---	600	1170	517	356	787	236	153
31	225	---	384	328	---	430	---	459	---	687	312	---
TOTAL	6224	12408	15576	8975	8329	11015	24371	25635	12349	10917	6995	5142
MEAN	201	414	502	290	297	355	812	827	412	352	226	171
MAX	235	1180	1090	369	528	860	2000	3870	1360	1380	826	680
MIN	171	178	297	221	198	222	370	381	175	160	129	117
CFSM	.45	.93	1.13	.65	.67	.80	1.83	1.86	.93	.79	.51	.39
IN.	.52	1.04	1.31	.75	.70	.92	2.04	2.15	1.03	.91	.59	.43

CAL YR 1982 TOTAL 156394 MEAN 428 MAX 3550 MIN 116 CFSM .96 IN 13.10
WTR YR 1983 TOTAL 147936 MEAN 405 MAX 3870 MIN 117 CFSM .91 IN 12.39

04164100 EAST POND CREEK AT ROMEO, MI

LOCATION.--Lat 42°49'21", long 83°01'13", in NE1/4 SE1/4 sec.27, T.5 N., R.12 E., Macomb County, Hydrologic Unit 04090003, on right bank at upstream side bridge on State Highway 53, and 1.4 mi north of Romeo.

DRAINAGE AREA.--21.8 mi^2.

PERIOD OF RECORD.--September 1958 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 780 ft from topographic map (nearest 10 ft).

REMARKS.--Records good. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--25 years, 15.3 ft^3/s, 9.53 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 358 ft^3/s Feb. 10, 1965, gage height, 4.48 ft; maximum gage height, 4.56 ft Mar. 12, 1962, backwater from ice; minimum discharge, 0.8 ft^3/s July 30, 31, 1964, Aug. 6, 7, 1965; minimum gage height, 0.71 ft July 21, 1959.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 124 ft^3/s May 2, gage height, 2.73 ft, only peak above base of 80 ft^3/s; minimum, 2.3 ft^3/s July 18, 19, gage height, 0.89 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	8.8	8.4	18	15	9.2	15	20	39	20	11	13	5.2
2	8.5	11	17	14	12	14	20	98	19	11	8.0	4.9
3	8.1	14	18	13	16	16	25	76	21	9.9	7.3	4.9
4	7.9	14	20	12	13	15	23	55	32	9.5	7.7	4.1
5	7.7	14	22	11	12	18	21	46	26	11	8.4	3.5
6	9.5	13	24	11	11	21	21	41	29	9.9	8.0	3.5
7	11	11	20	11	11	23	24	37	29	9.5	7.3	3.5
8	11	11	18	12	10	22	22	41	27	9.2	6.7	3.5
9	9.5	11	17	11	9.5	21	23	38	25	8.4	6.4	3.5
10	8.0	12	16	12	9.5	19	33	35	26	7.7	6.4	3.4
11	7.1	23	15	14	9.2	16	29	30	23	6.1	11	3.4
12	6.7	27	13	13	9.2	14	27	25	18	5.5	15	3.4
13	6.4	23	12	12	9.2	13	28	25	16	4.9	11	3.4
14	6.3	19	11	12	8.8	12	42	23	14	4.9	8.8	3.4
15	6.3	15	12	12	9.2	12	45	21	13	4.6	7.3	3.4
16	6.4	12	24	11	9.5	11	38	19	11	4.3	7.0	4.6
17	6.4	11	20	10	11	11	40	17	9.9	4.1	6.7	4.1
18	6.6	10	17	9.5	11	12	38	14	9.2	2.6	6.7	4.1
19	7.0	10	18	8.7	12	15	36	15	8.8	3.2	6.4	4.3
20	7.3	24	20	8.2	13	15	35	26	8.8	3.4	5.5	4.3
21	7.0	25	17	8.0	14	15	34	25	8.4	7.0	5.2	6.7
22	6.0	20	17	8.2	15	15	31	28	8.4	9.9	6.1	4.9
23	5.5	21	17	8.4	20	14	29	30	9.5	8.4	5.8	4.3
24	5.0	26	21	8.8	17	14	27	26	9.2	9.2	5.2	4.3
25	4.8	21	24	9.2	16	14	25	26	9.2	7.7	4.9	4.3
26	4.6	18	23	8.8	14	14	21	26	8.4	6.7	5.2	4.3
27	4.6	17	21	8.6	14	18	21	23	7.3	5.8	4.9	4.1
28	5.8	17	23	8.4	14	25	21	21	14	5.2	4.6	4.1
29	6.1	22	21	8.0	---	23	23	22	14	7.0	4.6	4.6
30	7.0	20	18	8.8	---	21	31	22	11	7.3	4.9	4.9
31	7.0	---	17	9.2	---	21	---	21	---	8.0	6.1	---
TOTAL	219.9	500.4	571	326.8	339.3	509	853	991	485.1	222.9	222.1	124.9
MEAN	7.09	16.7	18.4	10.5	12.1	16.4	28.4	32.0	16.2	7.19	7.16	4.16
MAX	11	27	24	15	20	25	45	98	32	11	15	6.7
MIN	4.6	8.4	11	8.0	8.8	11	20	14	7.3	2.6	4.6	3.4
CFSM	.33	.77	.84	.48	.56	.75	1.30	1.47	.74	.33	.33	.19
IN.	.38	.85	.97	.56	.58	.87	1.46	1.69	.83	.38	.38	.21

CAL YR 1982 TOTAL 6247.6 MEAN 17.1 MAX 116 MIN 3.3 CFSM .78 IN 10.66
WTR YR 1983 TOTAL 5365.4 MEAN 14.7 MAX 98 MIN 2.6 CFSM .67 IN 9.16

04164300 EAST BRANCH COON CREEK AT ARMADA, MI

LOCATION.--Lat 42°50'45",long 82°53'06", in NE1/4 sec.23, T.5 N., R.13 E., Macomb County, Hydrologic Unit 04090003, on right bank at downstream side of bridge on Prospect Street in Armada.

DRAINAGE AREA.--13.0 mi^2.

PERIOD OF RECORD.--October 1958 to current year.

GAGE.--Water-stage recorder and concrete control. Altitude of gage is 735 ft from topographic map (nearest 5 ft).

REMARKS.--Records good. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--25 years, 6.66 ft^3/s, 6.96 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 910 ft^3/s Apr. 19, 1975, gage height, 6.69 ft; no flow Jan. 25 to Feb. 9, 1961, result of freezeup.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 100 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Apr. 10	0800	106	2.84	May 2	0600	*462	*4.97
Apr. 14	1700	250	3.85	Aug. 12	0400	208	3.60

Minimum discharge, 0.01 ft^3/s Sept. 17, 20; minimum gage height, 1.61 ft July 20.

REVISIONS.--The peak discharges and annual maximum (*) for water year 1982 have been revised as shown in the following table. They supersede figures published in the report for 1982.

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Oct. 1, 1981	unknown	*540	unknown	Apr. 3, 1982	1400	160	3.28
Mar. 13, 1982	2000	516	5.22	Apr. 17, 1982	0600	196	3.51
Mar. 31, 1982	0200	499	5.14				

The revised daily discharges in cubic feet per second, for the high-water period in March and April 1982, are given below. These figures supersede those published in the report for 1982.

Mar. 13	244	Mar. 23	68	Apr. 2	33	Apr. 12	44
14	292	24	67	3	83	13	90
15	231	25	49	4	30	14	36
16	202	26	34	5	9.0	15	15
17	213	27	16	6	2.5	16	13
18	155	28	9.6	7	4.8	17	117
19	128	29	11	8	5.6	18	32
20	93	30	62	9	9.6		
21	93	31	276	10	17		
22	73	Apr. 1	72	11	24		

MONTH	TOTAL	MEAN	MAX	MIN	CFSM	IN.
March 1982	2331.07	75.2	292	.95	5.78	6.67
April 1982	692.2	23.1	117	1.8	1.78	1.98
Wtr Yr 1982	4180.70	11.5	292	.03	.88	11.96

04164300 EAST BRANCH COON CREEK AT ARMADA, MI--CONTINUED

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.12	.48	2.1	2.5	1.5	2.8	6.0	48	4.5	1.0	12	.39
2	.12	.70	1.5	2.3	7.8	3.1	5.6	272	3.8	.70	12	.31
3	.12	.48	1.7	2.1	17	3.4	9.6	74	4.5	.48	6.6	.18
4	.12	.31	4.1	1.7	4.1	4.1	7.8	39	19	.70	3.4	.12
5	.12	.24	7.2	1.5	2.8	4.1	5.6	16	14	.85	1.9	.08
6	.18	.24	10	1.5	1.5	4.5	4.5	9.0	16	.48	1.3	.12
7	.24	.24	4.1	1.7	1.3	5.6	6.6	6.6	20	.39	.85	.08
8	.24	.24	2.5	1.5	1.2	17	6.6	9.6	10	.31	.70	.08
9	.24	.24	2.1	1.3	1.0	15	10	7.8	5.2	.24	.39	.05
10	.31	.31	1.5	1.7	.85	7.8	76	5.2	4.1	.18	.31	.03
11	.39	1.3	1.3	2.8	.70	5.2	33	4.5	2.8	.18	5.3	.05
12	.39	1.3	1.2	2.3	.58	3.4	21	3.8	2.3	.18	112	.05
13	.48	.85	.85	1.9	.58	3.1	17	3.1	1.9	.18	22	.08
14	.48	.58	.85	1.5	.58	2.8	156	2.8	1.5	.24	9.6	.08
15	.39	.48	1.2	1.7	1.0	2.8	94	2.8	1.3	.18	4.5	.12
16	.39	.39	6.0	1.5	1.5	2.3	31	2.3	1.2	.12	2.3	.18
17	.39	.39	5.2	1.2	4.5	2.3	16	2.1	1.3	.24	1.7	.05
18	.39	.39	3.1	1.0	3.1	2.1	19	1.9	1.2	.18	1.3	.05
19	.39	.39	3.4	1.0	2.8	3.1	34	2.3	1.0	.08	1.0	.08
20	.48	2.1	9.6	.58	3.8	4.1	38	12	.85	.08	.85	.05
21	.39	1.9	7.2	.48	4.5	3.1	24	14	.85	.31	.70	.39
22	.39	1.5	4.5	.48	4.8	2.5	12	15	.85	.18	.85	.12
23	.39	2.3	4.8	.70	14	2.8	8.4	17	.70	.12	.58	.18
24	.39	3.4	21	.70	11	2.5	6.0	9.6	.58	.12	.58	.08
25	.48	2.3	28	1.0	5.6	2.5	4.5	6.6	.39	.18	.39	.05
26	.48	1.3	21	1.0	3.4	2.8	3.8	6.0	.24	.12	.39	.05
27	.39	1.0	9.6	.85	2.8	14	3.1	4.8	.48	.08	.31	.05
28	.39	1.3	12	.58	2.8	71	3.1	4.1	1.2	.12	.24	.05
29	.31	2.8	11	.58	---	29	3.8	4.5	.70	.70	.24	.08
30	.39	3.8	5.2	1.7	---	11	23	5.2	.85	.24	.31	.08
31	.39	---	3.4	3.1	---	7.8	---	4.5	---	4.8	.39	---
TOTAL	10.37	33.25	197.20	44.45	107.09	247.6	689.0	616.1	123.29	13.96	204.98	3.36
MEAN	.33	1.11	6.36	1.43	3.82	7.99	23.0	19.9	4.11	.45	6.61	.11
MAX	.48	3.8	28	3.1	17	71	156	272	20	4.8	112	.39
MIN	.12	.24	.85	.48	.58	2.1	3.1	1.9	.24	.08	.24	.03
CFSM	.03	.09	.49	.11	.29	.62	1.77	1.53	.32	.04	.51	.008
IN.	.03	.10	.56	.13	.31	.71	1.97	1.76	.35	.04	.59	.01

CAL YR 1982 TOTAL 3445.82 MEAN 9.44 MAX 292 MIN .03 CFSM .73 IN 9.86
WTR YR 1983 TOTAL 2290.65 MEAN 6.28 MAX 272 MIN .03 CFSM .48 IN 6.55

04164500 NORTH BRANCH CLINTON RIVER NEAR MOUNT CLEMENS, MI

LOCATION.--Lat 42°37'45", long 82°53'25", in SW1/4 sec.35, T.3 N., R.13 E., Macomb County, Hydrologic Unit 04090003, on left bank 30 ft upstream from bridge on State Highway 59, 2 mi north of Mount Clemens, and 3.6 mi upstream from mouth.

DRAINAGE AREA.--199 mi^2.

PERIOD OF RECORD.--May 1947 to current year.

REVISED RECORDS.--WSP 1437: 1948. WSP 1557: Drainage area.

GAGE.--Water-stage recorder. Concrete control since September 1961. Datum of gage is 576.38 ft National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Prior to Nov. 15, 1949, nonrecording gage at same site and datum.

REMARKS.--Records good. Some regulation at times by mill above station. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--36 years, 121 ft^3/s, 8.26 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 6,700 ft^3/s Feb. 2, 1968, gage height, 18.62 ft; minimum, 0.2 ft^3/s Sept. 13, 14, 1954, July 30, 1965; minimum gage height, 3.12 ft Sept. 13, 14, 1954.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of Apr.5 or 6,1947,reached a stage of 20.0 ft. from floodmark.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 3,060 ft^3/s May 3, gage height, 14.78 ft, only peak above base of 1,200 ft^3/s; minimum, 4.1 ft^3/s Sept. 14, gage height, 4.03 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	17	16	134	121	52	83	146	600	101	44	39	14
2	15	24	92	92	59	84	122	1310	90	38	61	13
3	14	37	74	78	174	85	140	2670	81	32	61	10
4	14	38	109	83	221	91	207	1300	149	28	39	7.9
5	18	32	173	71	116	117	171	656	286	28	30	8.0
6	14	27	225	63	71	119	133	369	251	34	26	7.2
7	13	24	231	60	60	158	170	231	399	31	22	6.8
8	13	21	137	60	49	221	239	224	339	23	19	6.3
9	16	20	88	59	48	294	201	281	165	20	18	5.4
10	17	19	68	58	39	250	491	218	111	17	15	5.2
11	15	21	59	71	34	164	662	156	96	16	17	5.8
12	14	49	54	89	33	119	543	126	83	12	33	5.1
13	14	81	37	70	32	96	318	108	69	11	83	5.1
14	13	77	36	74	32	87	441	98	59	9.2	86	4.6
15	13	50	35	65	37	82	953	91	51	9.0	48	5.3
16	13	37	125	68	42	75	1050	84	71	8.4	32	8.2
17	12	32	303	47	59	67	610	76	60	7.7	25	9.9
18	11	28	205	46	80	63	390	68	46	7.3	20	12
19	11	26	120	34	83	68	386	67	37	6.4	19	12
20	10	34	163	31	90	99	440	101	33	5.9	17	12
21	9.9	90	219	29	103	103	472	173	30	15	14	14
22	12	111	161	29	110	86	389	165	27	26	12	22
23	12	85	108	29	160	80	250	221	24	29	15	25
24	12	122	159	34	253	85	181	306	22	23	17	19
25	12	151	339	39	194	83	146	162	20	20	14	14
26	12	104	478	39	117	87	124	126	19	16	12	13
27	11	72	395	35	95	119	106	121	19	13	12	14
28	11	57	251	31	87	369	95	101	35	10	11	14
29	10	111	321	32	---	500	99	96	62	16	11	13
30	12	171	243	34	---	392	209	117	58	22	9.0	14
31	13	---	120	46	---	200	---	113	---	44	11	---
TOTAL	403.9	1767	5262	1717	2530	4526	9884	10535	2893	621.9	848.0	325.8
MEAN	13.0	58.9	170	55.4	90.4	146	329	340	96.4	20.1	27.4	10.9
MAX	18	171	478	121	253	500	1050	2670	399	44	86	25
MIN	9.9	16	35	29	32	63	95	67	19	5.9	9.0	4.6
CFSM	.07	.30	.85	.28	.45	.73	1.65	1.71	.48	.10	.14	.06
IN.	.08	.33	.98	.32	.47	.85	1.85	1.97	.54	.12	.16	.06

CAL YR 1982 TOTAL 57782.1 MEAN 158 MAX 4050 MIN 2.2 CFSM .79 IN 10.80
WTR YR 1983 TOTAL 41313.6 MEAN 113 MAX 2670 MIN 4.6 CFSM .57 IN 7.72

04165500 CLINTON RIVER AT MOUNT CLEMENS, MI
(National stream-quality accounting network station)

LOCATION.--Lat 42°35'45", long 82°54'35", Macomb County, Hydrologic Unit 04090003, on left bank 10 ft downstream from bridge on Moravian Drive, 0.2 mi downstream from North Branch, and 0.5 mi west of Mount Clemens.

DRAINAGE AREA.--734 mi^2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--May 1934 to current year.

REVISED RECORDS.--WSP 1084: 1943, 1945-46. WSP 1937: 1935, 1936(M), 1937-39, 1949(M), 1950. WSP 1557: Drainage area. WSP 1727: 1952(M), 1954(M).

GAGE.--Water-stage recorder. Datum of gage is 570.43 ft National Geodetic Vertical Datum of 1929. May 10, 1934, to Jan. 11, 1939, nonrecording gage at same site and datum. Auxiliary gage is a water-stage recorder on right bank 2.0 mi downstream from base gage at same datum. Mar. 15, 1938, to Jan. 3, 1952, auxililary nonrecording gage 1.6 mi downstream from base gage at same datum.

REMARKS.--Water-discharge records fair. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--49 years, 530 ft^3/s, 9.81 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 21,200 ft^3/s Apr. 6, 1947, gage height, 23.55 ft, from floodmark; minimum not determined; minimum gage height, 2.72 ft Nov. 29, 1963.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 3,000 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Apr. 15	0200	3,520	10.07	May 2	2200	*7,260	*13.81

Minimum daily discharge, 130 ft^3/s Sept. 11-13; minimum gage height, 4.78 ft Oct. 16.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	270	479	543	500	315	437	572	2280	594	467	1070	190
2	270	1220	471	460	508	431	596	5800	525	437	597	160
3	250	707	467	430	757	428	797	6320	472	269	387	150
4	210	358	888	420	514	447	757	3590	900	374	340	140
5	210	269	796	400	388	440	667	2110	871	632	280	150
6	200	250	977	380	326	556	717	1510	1190	292	250	179
7	220	220	735	400	299	674	1080	1220	1430	300	230	150
8	240	210	576	390	301	833	994	1520	1040	280	220	140
9	220	250	489	370	287	807	880	1430	783	270	210	140
10	260	324	447	430	280	676	2310	1120	673	250	200	140
11	260	309	415	470	239	559	1670	964	580	230	543	130
12	250	669	355	450	237	467	1280	834	501	220	328	130
13	245	524	337	400	244	423	1050	760	445	210	300	130
14	240	336	390	380	242	409	2100	690	405	250	280	135
15	240	275	398	390	295	407	3170	613	366	240	230	135
16	240	275	1330	370	353	390	2430	526	366	190	200	270
17	215	275	1010	330	425	365	1780	504	320	180	190	260
18	210	300	701	300	420	320	1630	461	290	200	190	170
19	225	320	657	270	433	450	1420	583	260	698	180	210
20	255	1010	850	280	470	431	1450	802	240	595	180	200
21	250	916	722	280	459	390	1380	656	230	254	170	759
22	230	556	603	310	494	394	1150	827	230	556	170	240
23	220	590	539	270	727	373	916	1110	240	260	160	220
24	210	990	715	370	670	400	763	912	230	230	160	213
25	215	593	1230	360	623	376	679	772	210	210	160	170
26	225	458	1260	310	508	382	628	770	200	200	155	160
27	220	409	895	280	453	585	560	714	300	200	155	170
28	220	522	940	270	439	1360	558	621	1520	210	150	170
29	220	889	900	280	---	1100	674	693	830	1330	150	160
30	230	670	700	380	---	878	1410	750	396	1050	240	170
31	250	---	550	400	---	651	---	658	---	868	379	---
TOTAL	7220	15173	21886	11330	11706	16839	36068	42120	16637	11952	8454	5741
MEAN	233	506	706	365	418	543	1202	1359	555	386	273	191
MAX	270	1220	1330	500	757	1360	3170	6320	1520	1330	1070	759
MIN	200	210	337	270	237	320	558	461	200	180	150	130
CFSM	.32	.69	.96	.50	.57	.74	1.64	1.85	.76	.53	.37	.26
IN.	.37	.77	1.11	.57	.59	.85	1.83	2.13	.84	.61	.43	.29

CAL YR 1982 TOTAL 235099 MEAN 644 MAX 6500 MIN 130 CFSM .88 IN 11.92
WTR YR 1983 TOTAL 205126 MEAN 562 MAX 6320 MIN 130 CFSM .77 IN 10.40

04165500 CLINTON RIVER AT MOUNT CLEMENS, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1975 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: October 1974 to September 1981.
WATER TEMPERATURES: October 1974 to September 1981.

INSTRUMENTATION.--Water-quality monitor August 1975 to September 1981.

REMARKS.--Quarterly samples collected at bridge.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum, 3,580 micromhos Jan. 26, 1978; minimum recorded (water years 1975-76, 1978-81), 126 micromhos July 29, 1976.
WATER TEMPERATURES: Maximum, 29.5°C Sept. 20, 1978; minimum, 0.0°C on many days during winter periods.

WATER QUALITY DATA, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (STAND-ARD UNITS)	TEMPER-ATURE (DEG C)	TUR-BID-ITY (NTU)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)
NOV 10...	1200	351	764	7.5	9.5	4.1	--	--	E300	>2000
MAR 10...	1220	651	805	7.8	6.0	9.3	11.6	95	K710	E1100
MAY 19...	0930	418	774	8.3	14.0	4.0	6.0	60	K93	E2900
SEP 01...	1045	184	617	7.9	22.0	6.4	6.4	74	4200	2400

DATE	HARD-NESS (MG/L AS CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	PERCENT SODIUM	SODIUM AD-SORP-TION RATIO	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	ALKA-LINITY LAB (MG/L AS CACO3)	CARBON DIOXIDE DIS-SOLVED (MG/L AS CO2)
NOV 10...	249	65	21	54	32	1.5	4.9	178	11
MAR 10...	295	80	23	48	26	1.3	3.7	195	6.0
MAY 19...	293	76	25	56	29	1.5	3.9	210	2.0
SEP 01...	202	56	15	46	32	1.5	5.0	137	3.3

DATE	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER AC-FT)	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)
NOV 10...	56	92	.4	6.2	449	407	.61	426	4.0
MAR 10...	77	94	.3	4.9	495	448	.67	870	2.2
MAY 19...	66	90	.3	2.7	500	447	.68	564	2.2
SEP 01...	51	74	.5	6.0	402	337	.55	200	2.5

DATE	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS, DIS-SOLVED (MG/L AS P)	PHOS-PHORUS, ORTHO, DIS-SOLVED (MG/L AS P)	PHOS-PHATE, ORTHO, DIS-SOLVED (MG/L AS PO4)	SEDI-MENT, SUS-PENDED (MG/L)	SEDI-MENT, DIS-CHARGE, SUS-PENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
NOV 10...	.240	.80	.170	.120	.130	.40	18	17	100
MAR 10...	.110	1.10	.090	.040	.040	.12	24	42	96
MAY 19...	.170	1.00	.120	.080	.060	.18	29	33	100
SEP 01...	.150	.50	.160	.120	.140	.43	18	8.9	100

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04165500 CLINTON RIVER AT MOUNT CLEMENS, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DATE	TIME	ALUMINUM, DISSOLVED (UG/L AS AL)	ARSENIC DISSOLVED (UG/L AS AS)	BARIUM, DISSOLVED (UG/L AS BA)	BERYLLIUM, DISSOLVED (UG/L AS BE)	CADMIUM DISSOLVED (UG/L AS CD)	CHROMIUM, DISSOLVED (UG/L AS CR)	COBALT, DISSOLVED (UG/L AS CO)	COPPER, DISSOLVED (UG/L AS CU)	IRON, DISSOLVED (UG/L AS FE)	LEAD, DISSOLVED (UG/L AS PB)
NOV											
10...	1200	30	2	57	<1	<1	<1	<3	3	28	1
MAR											
10...	1220	<10	1	59	<1	<1	<1	<3	2	22	3
MAY											
19...	0930	<10	1	90	1	1	<1	3	6	14	2
SEP											
01...	1045	40	3	70	<1	<1	1	<3	6	19	2

DATE	LITHIUM DISSOLVED (UG/L AS LI)	MANGANESE, DISSOLVED (UG/L AS MN)	MERCURY DISSOLVED (UG/L AS HG)	MOLYBDENUM, DISSOLVED (UG/L AS MO)	NICKEL, DISSOLVED (UG/L AS NI)	SELENIUM, DISSOLVED (UG/L AS SE)	SILVER, DISSOLVED (UG/L AS AG)	STRONTIUM, DISSOLVED (UG/L AS SR)	VANADIUM, DISSOLVED (UG/L AS V)	ZINC, DISSOLVED (UG/L AS ZN)
NOV										
10...	8	33	.2	<10	22	<1	<1	210	<6.0	14
MAR										
10...	5	38	.2	10	9	<1	<1	240	<6.0	9
MAY										
19...	4	39	.1	10	10	1	<1	230	6.0	5
SEP										
01...	11	36	.2	<10	14	<1	<1	210	<6.0	11

04165556 CLINTON RIVER BY-PASS BELOW WEIR AT MOUNT CLEMENS, MI

LOCATION.--Lat 42°34'43", long 82°52'34", in NW1/4 sec.23, T.2 N., R.13 E., Macomb County, Hydrologic Unit 04090003, on right bank 600 ft downstream from weir on Wellington Crescent in Mount Clemens.

PERIOD OF RECORD.--December 1979 to September 1983 (gage heights only) (discontinued).

GAGE.--Water-stage recorder. Datum of gage is 570.43 ft National Geodetic Vertical Datum of 1929.

REMARKS.--Records good.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height, 8.69 ft Oct. 1, 1981; minimum, 4.13 ft Nov. 12, 1982.

EXTREMES FOR CURRENT YEAR.--Maximum gage height, 8.12 ft May 3; minimum, 4.13 ft Nov. 12.

GAGE HEIGHT (FEET ABOVE DATUM), WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	5.16	4.95	5.23	5.46	5.16	5.28	5.55	6.13	6.23	6.55	6.58	6.22
2	5.25	5.16	5.24	5.39	5.35	5.25	5.82	7.41	6.27	6.54	6.61	6.23
3	5.14	5.06	5.25	5.39	5.35	5.26	5.54	7.77	6.31	6.53	6.62	6.21
4	5.15	4.99	5.30	5.51	5.16	5.24	5.41	6.78	6.32	6.50	6.56	6.18
5	5.16	4.84	5.42	5.34	5.35	5.29	5.46	6.45	6.30	6.47	6.52	6.16
6	5.14	4.83	5.25	5.41	5.39	5.36	5.52	6.45	6.38	6.48	6.50	6.08
7	5.10	4.93	5.27	5.08	5.38	5.29	5.54	6.39	6.36	6.50	6.48	6.05
8	5.08	4.87	5.31	5.26	5.38	5.26	5.54	6.15	6.39	6.45	6.41	6.10
9	5.17	4.96	5.31	5.39	5.26	5.25	5.80	6.29	6.43	6.44	6.39	6.09
10	5.28	5.13	5.31	5.39	5.09	5.16	5.90	6.26	6.35	6.42	6.45	6.05
11	4.99	5.02	5.21	5.14	5.06	5.07	5.82	6.24	6.35	6.43	6.52	5.99
12	4.95	4.92	5.19	5.13	5.02	5.26	5.82	6.21	6.34	6.38	6.42	6.00
13	4.96	4.80	5.25	5.28	4.95	5.37	5.98	6.20	6.33	6.37	6.46	5.99
14	4.83	4.96	5.21	5.46	4.92	5.32	6.13	6.18	6.33	6.35	6.45	5.99
15	4.72	4.88	5.15	5.06	4.94	5.29	6.13	6.12	6.29	6.34	6.41	6.06
16	4.69	4.98	5.18	5.23	5.03	5.33	6.10	6.15	6.31	6.32	6.38	6.04
17	4.91	4.98	5.41	5.21	5.08	5.34	5.96	6.17	6.27	6.31	6.33	5.87
18	4.95	4.98	5.51	5.01	5.17	5.40	5.95	6.21	6.28	6.35	6.30	5.95
19	4.93	5.02	5.30	5.24	5.20	5.31	5.94	6.33	6.29	6.41	6.30	5.92
20	4.86	5.15	5.14	5.41	5.24	5.33	5.88	6.20	6.29	6.38	6.26	5.92
21	4.64	5.08	5.20	5.34	5.27	5.36	5.86	6.21	6.31	6.37	6.33	5.87
22	4.75	5.13	5.37	5.41	5.33	5.26	5.92	6.33	6.31	6.43	6.22	5.78
23	4.81	5.14	5.35	5.36	5.35	5.30	5.87	6.18	6.30	6.39	6.26	5.75
24	4.84	5.13	5.33	5.28	5.36	5.36	5.71	6.27	6.27	6.28	6.28	5.87
25	4.84	5.18	5.45	5.16	5.29	5.42	5.71	6.23	6.28	6.30	6.26	5.90
26	4.84	5.14	5.48	5.25	5.38	5.50	5.79	6.19	6.29	6.28	6.24	5.81
27	4.85	5.22	5.65	5.26	5.38	5.56	5.74	6.30	6.30	6.31	6.23	5.84
28	4.87	5.32	5.61	5.24	5.32	5.45	5.75	6.29	6.65	6.28	6.21	5.85
29	4.84	5.20	5.42	5.19	---	5.47	5.80	6.32	6.70	6.53	6.21	5.84
30	4.81	5.24	5.52	5.18	---	5.55	5.90	6.27	6.67	6.57	6.20	5.83
31	4.83	---	5.57	5.13	---	5.51	---	6.22	---	6.62	6.20	---
MEAN	4.95	5.04	5.34	5.28	5.22	5.34	5.79	6.35	6.35	6.42	6.37	5.98
MAX	5.28	5.32	5.65	5.51	5.39	5.56	6.13	7.77	6.70	6.62	6.62	6.23
MIN	4.64	4.80	5.14	5.01	4.92	5.07	5.41	6.12	6.23	6.28	6.20	5.75

04165557 CLINTON RIVER BY-PASS AT MOUTH AT MOUNT CLEMENS, MI

LOCATION.--Lat 42°33'41", long 82°50'42", in SW1/4 sec.30, T.2 N., R.14 E., Macomb County, Hydrologic Unit 04090003, on left bank at mouth, in Mount Clemens.

PERIOD OF RECORD.--October 1979 to September 1983 (gage heights only) (discontinued).

GAGE.--Water-stage recorder. Altitude of gage is 580 ft, from topographic map.

REMARKS.--Records fair. Mean daily gage heights are affected by wave and seiche action of Lake St. Clair.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily gage height recorded, 3.27 ft Aug. 2, 1983; minimum daily, 0.73 ft Jan. 21, 22, 1981.

EXTREMES FOR CURRENT YEAR.--Maximum daily gage height recorded, 3.27 ft Aug. 2; minimum daily, 1.36 ft Oct. 16, 29.

GAGE HEIGHT (FEET ABOVE DATUM), WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.78	1.53	1.81	1.95	1.75	1.88	1.93	2.42	2.84	3.08	3.23	2.88
2	1.92	1.65	1.84	1.97	1.94	1.87	1.77	2.64	2.83	3.07	3.27	2.83
3	1.96	1.69	1.80	1.97	1.93	1.82	2.03	2.90	2.74	2.93	3.25	2.75
4	1.97	1.64	1.83	1.95	1.79	1.77	2.01	2.92	2.86	3.09	3.19	2.73
5	1.92	1.39	1.81	1.89	1.96	1.68	2.05	2.92	2.86	---	3.18	2.71
6	1.90	1.38	1.78	1.80	2.01	1.91	2.01	2.76	2.94	---	3.11	2.69
7	1.88	1.45	1.81	1.62	2.02	1.94	2.10	2.69	2.93	---	3.09	2.72
8	1.92	1.49	1.88	1.82	2.01	1.81	2.11	2.70	2.92	---	3.07	2.74
9	1.81	1.55	1.81	1.61	1.89	1.84	1.92	2.86	2.58	---	3.05	2.63
10	1.84	1.54	1.85	1.58	1.72	1.77	2.26	2.84	2.88	---	3.00	2.67
11	1.86	1.56	1.90	1.68	1.68	1.69	2.34	2.82	2.88	---	2.86	2.64
12	1.79	1.47	1.87	1.70	1.65	1.88	2.36	2.77	2.86	---	3.07	2.69
13	1.74	1.45	1.81	1.82	1.58	1.94	1.95	2.63	2.90	---	3.03	2.67
14	1.52	1.53	1.86	1.71	1.53	1.92	2.10	2.68	2.88	---	2.94	2.67
15	1.43	1.45	1.86	1.67	1.55	1.90	2.43	2.70	2.84	---	2.96	2.40
16	1.36	1.52	1.67	1.82	1.63	1.89	2.46	2.74	2.88	---	2.93	2.43
17	1.37	1.56	1.89	1.79	1.69	1.84	2.28	2.67	2.85	---	2.88	2.51
18	1.59	1.54	1.90	1.81	1.77	1.69	2.48	2.51	2.82	---	2.94	2.29
19	1.58	1.51	2.02	2.00	1.82	1.88	2.50	2.64	2.84	---	2.90	2.54
20	1.38	1.58	1.81	1.97	1.85	1.88	2.45	2.80	2.89	---	2.88	2.36
21	1.41	1.67	1.74	1.90	1.88	1.92	2.44	2.82	2.87	---	2.74	2.53
22	1.51	1.66	1.80	1.95	1.95	1.89	2.50	2.83	2.87	3.01	2.83	2.44
23	1.51	1.67	1.92	1.90	1.96	1.94	2.47	2.78	2.83	2.90	2.90	2.42
24	1.54	1.66	2.00	1.82	1.97	1.99	2.33	2.84	2.86	2.92	2.87	2.41
25	1.55	1.67	1.97	1.71	1.91	2.02	2.34	2.81	2.84	2.96	2.86	2.32
26	1.53	1.67	1.97	1.79	1.92	1.78	2.41	2.81	2.80	2.94	2.88	2.43
27	1.49	1.74	2.08	1.81	1.88	1.80	2.36	2.85	2.87	2.90	2.87	2.49
28	1.37	1.87	2.03	1.79	1.90	2.00	2.35	2.83	2.95	2.78	2.84	2.49
29	1.36	2.06	1.96	1.74	---	2.06	2.38	2.73	2.98	2.95	2.86	2.48
30	1.39	1.95	2.08	1.72	---	2.00	2.38	2.79	2.91	3.21	2.78	2.47
31	1.47	---	2.06	1.68	---	2.07	---	2.82	---	3.21	2.87	---
MEAN	1.63	1.60	1.88	1.80	1.83	1.88	2.25	2.76	2.86	---	2.97	2.57
MAX	1.97	2.06	2.08	2.00	2.02	2.07	2.50	2.92	2.98	---	3.27	2.88
MIN	1.36	1.38	1.67	1.58	1.53	1.68	1.77	2.42	2.58	---	2.74	2.29

04165700 DETROIT RIVER AT DETROIT, MI
(National stream-quality accounting network station)

LOCATION.--Lat 42°20'50", long 82°57'31", in T.2 S., R.13 E., Wayne County, Hydrologic Unit 04090004, at Detroit municipal water treatment facility at Water Works Park in Detroit.

DRAINAGE AREA.--228,800 mi^2, approximately.

PERIOD OF RECORD.--Water years 1970 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: February 1974 to September 1981.
WATER TEMPERATURES: October 1973 to September 1981.

REMARKS.--Quarterly surface samples collected near the municipal water intake. The intake is in a lagoon at north end of Belle Isle in the Detroit River. Daily-mean water discharges are reported for sampling times.

COOPERATION.--Water discharges were furnished by the National Oceanic and Atmospheric Administration.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum daily, 383 micromhos Apr. 8, 1979; minimum daily, 194 micromhos July 24, 1976.
WATER TEMPERATURES: Maximum daily, 24.5°C July 21, 1977, Aug. 29-31, 1980; minimum daily, 0.0°C Jan. 8, 1980.

EXTREMES OUTSIDE PERIOD OF DAILY RECORD.--A specific conductance value of 174 micromhos, and a water temperature of 0.0°C, were observed on Jan. 12, 1982.

WATER QUALITY DATA, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DATE	TIME	DIS-CHARGE, IN CUBIC FEET PER SECOND	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (STAND-ARD UNITS)	TEMPER-ATURE (DEG C)	TUR-BID-ITY (NTU)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD-NESS (MG/L AS CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)
NOV												
09...	1045	200000	201	7.6	7.5	3.5	--	--	K8	K7	103	28
MAR												
09...	1030	206000	212	7.5	4.0	<1.0	13.6	106	<1	K1	96	27
MAY												
18...	0930	198000	225	8.4	11.0	3.1	11.2	102	K1	E24	108	30
AUG												
30...	1600	218000	203	8.4	24.0	1.0	9.0	109	K2	27	101	28

DATE	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	PERCENT SODIUM	SODIUM AD-SORP-TION RATIO	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	ALKA-LINITY LAB (MG/L AS CACO3)	CARBON DIOXIDE DIS-SOLVED (MG/L AS CO2)	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)
NOV											
09...	7.9	3.8	7	.2	.7	81	3.9	18	6.2	<.1	1.4
MAR											
09...	6.8	3.6	8	.2	.9	83	5.1	18	7.0	.1	1.2
MAY											
18...	8.1	5.7	10	.2	.9	84	.6	18	7.5	<.1	1.3
AUG											
30...	7.4	4.3	8	.2	.8	80	.6	16	6.7	.1	1.4

DATE	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER AC-FT)	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N)	NITRO-GEN,AM-MONIA + ORGANIC TOTAL (MG/L AS N)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS, DIS-SOLVED (MG/L AS P)	PHOS-PHORUS, ORTHO, DIS-SOLVED (MG/L AS P)	PHOS-PHATE, ORTHO, DIS-SOLVED (MG/L AS PO4)
NOV											
09...	119	115	.16	64300	.28	<.010	.40	.020	<.010	<.010	--
MAR											
09...	119	115	.16	66200	.35	.040	.20	<.010	<.010	<.010	--
MAY											
18...	136	122	.18	71600	.34	<.010	<.10	.020	<.010	.010	.03
AUG											
30...	104	113	.14	61200	.22	.030	.10	.010	<.010	--	--

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04165700 DETROIT RIVER AT DETROIT, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DATE	TIME	ALUMINUM, DIS-SOLVED (UG/L AS AL)	ARSENIC DIS-SOLVED (UG/L AS AS)	BARIUM, DIS-SOLVED (UG/L AS BA)	BERYLLIUM, DIS-SOLVED (UG/L AS BE)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHROMIUM, DIS-SOLVED (UG/L AS CR)	COBALT, DIS-SOLVED (UG/L AS CO)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, DIS-SOLVED (UG/L AS PB)
NOV 09...	1045	--	1	23	1	<1	<1	<3	1	10	1
MAR 09...	1030	<10	1	19	<1	<1	<1	<3	1	7	5
MAY 18...	0930	<10	1	49	1	1	<1	3	2	3	2
AUG 30...	1600	40	3	31	<1	<1	1	<3	2	10	1

DATE	LITHIUM DIS-SOLVED (UG/L AS LI)	MANGANESE, DIS-SOLVED (UG/L AS MN)	MERCURY DIS-SOLVED (UG/L AS HG)	MOLYBDENUM, DIS-SOLVED (UG/L AS MO)	NICKEL, DIS-SOLVED (UG/L AS NI)	SELENIUM, DIS-SOLVED (UG/L AS SE)	SILVER, DIS-SOLVED (UG/L AS AG)	STRONTIUM, DIS-SOLVED (UG/L AS SR)	VANADIUM, DIS-SOLVED (UG/L AS V)	ZINC, DIS-SOLVED (UG/L AS ZN)
NOV 09...	<4	<1	<.1	<10	<1	<1	<1	110	<6.0	<4
MAR 09...	<4	<1	.1	<10	3	<1	<1	97	<6.0	<3
MAY 18...	4	1	.1	10	1	1	<1	110	6.0	3
AUG 30...	<4	<1	<.1	<10	1	<1	<1	110	<6.0	53

04166000 RIVER ROUGE AT BIRMINGHAM, MI

LOCATION.--Lat 42°32'45", long 83°13'25", in NW1/4 sec.36, T.2 N., R.10 E., Oakland County, Hydrologic Unit 04090004, on left bank 25 ft downstream from mouth of Quarton Lake outlet, and 100 ft upstream from bridge on Maple Road, in Birmingham.

DRAINAGE AREA.--33.3 mi^2. Prior to water year 1971, drainage area was 36.9 mi^2. An area of 3.6 mi^2 noncontributing since then.

PERIOD OF RECORD.--June 1950 to current year.

REVISED RECORDS.--WSP 1387: 1951-52(M). WSP 1557: Drainage area.

GAGE.--Water-stage recorder. Concrete control since July 27,1962. Datum of gage is 715.94 ft National Geodetic Vertical Datum of 1929.

REMARKS.--Records good. Occasional regulation by Quarton Lake above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--20 years (water years 1951-70), 15.3 ft^3/s, 5.63 in/yr; 13 years (water years 1971-83), 22.3 ft^3/s, 9.09 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,390 ft^3/s June 26, 1968, gage height, 8.70 ft; minimum, 0.10 ft^3/s Aug. 8, 9, 1963; minimum gage height, 1.02 ft Oct. 12, 1961.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 180 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Apr. 14	1800	225	3.48	May 2	0400	*575	*5.20

Minimum discharge, 2.9 ft^3/s Sept. 12, gage height, 1.57 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	6.9	23	19	19	15	16	21	92	30	22	33	9.6
2	6.4	58	17	19	47	16	27	418	27	18	14	7.2
3	5.9	29	18	18	39	16	40	168	33	11	11	6.4
4	5.8	15	34	16	21	16	29	83	51	12	8.9	5.9
5	5.6	9.8	43	16	17	15	24	60	35	25	8.1	5.6
6	5.6	8.3	40	16	16	22	31	48	72	13	7.7	6.8
7	6.0	8.0	27	18	16	25	44	45	47	10	7.0	7.3
8	5.9	8.0	22	16	15	22	33	84	33	9.1	6.1	5.5
9	5.9	7.9	20	16	14	22	43	52	30	8.3	5.4	5.1
10	6.6	11	19	20	12	18	80	42	27	8.0	5.9	5.2
11	6.4	19	18	22	12	16	44	37	24	7.3	25	4.4
12	6.2	40	16	19	12	14	34	35	22	6.7	19	3.6
13	6.0	22	16	16	12	14	46	33	19	6.0	10	3.5
14	6.1	13	15	16	13	13	148	33	19	6.0	7.7	4.1
15	6.5	9.8	19	16	16	13	89	33	27	7.0	6.9	4.2
16	6.0	8.6	65	15	18	12	52	32	23	7.1	6.3	11
17	5.1	8.6	32	14	26	12	56	29	19	6.5	6.2	11
18	5.3	8.0	23	12	20	13	53	26	17	31	6.3	6.5
19	5.3	8.5	26	12	21	18	46	44	16	33	6.3	9.0
20	7.0	66	30	12	23	17	45	48	14	14	5.7	12
21	6.5	36	24	12	21	17	39	33	13	15	4.9	38
22	6.0	21	21	13	22	16	34	54	12	23	5.5	12
23	5.8	35	21	17	32	15	31	48	10	12	6.2	7.9
24	5.5	42	26	19	24	15	28	34	9.9	8.4	5.8	6.6
25	5.5	21	54	16	21	16	26	36	10	7.3	5.5	6.4
26	5.3	18	38	14	17	17	26	34	9.6	6.5	5.3	6.4
27	6.0	16	28	12	16	34	29	29	11	5.8	5.1	6.1
28	7.1	25	45	12	16	54	29	26	45	6.1	4.8	5.8
29	6.0	43	30	12	---	32	31	39	23	19	4.5	6.2
30	5.9	26	22	33	---	25	99	33	14	12	13	6.6
31	6.3	---	20	22	---	22	---	34	---	33	19	---
TOTAL	186.4	664.5	848	510	554	593	1357	1842	742.5	409.1	286.1	235.9
MEAN	6.01	22.2	27.4	16.5	19.8	19.1	45.2	59.4	24.8	13.2	9.23	7.86
MAX	7.1	66	65	33	47	54	148	418	72	33	33	38
MIN	5.1	7.9	15	12	12	12	21	26	9.6	5.8	4.5	3.5
CFSM	.18	.67	.82	.50	.60	.57	1.36	1.78	.75	.40	.28	.24
IN.	.21	.74	.95	.57	.62	.66	1.52	2.06	.83	.46	.32	.26

CAL YR 1982 TOTAL 9134.2 MEAN 25.0 MAX 357 MIN 4.1 CFSM .75 IN 10.20
WTR YR 1983 TOTAL 8228.5 MEAN 22.5 MAX 418 MIN 3.5 CFSM .68 IN 9.19

04166100 RIVER ROUGE AT SOUTHFIELD, MI

LOCATION.--Lat 42°26'52", long 83°17'52", in SW1/4 sec.32, T.1 N., R.10 E., Oakland County, Hydrologic Unit 04090004, on right bank at downstream side of bridge on Beech Road at Southfield, 4.2 mi east of Farmington.

DRAINAGE AREA.--87.9 mi^2.

PERIOD OF RECORD.--April 1958 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 609.62 ft, city of Southfield datum. Prior to Sept. 30. 1958, nonrecording gage at same site and datum.

REMARKS.--Records good. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--25 years, 60.2 ft^3/s, 9.30 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,900 ft^3/s June 26, 1968, gage height, 19.04 ft; minimum, 0.1 ft^3/s Aug. 2, 1964, gage height, 1.15 ft.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 500 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Apr. 15	0100	970	10.08	June 28	1900	650	8.82
May 2	0900	*1,900	*13.06				

Minimum discharge, 8.8 ft^3/s Sept. 14, gage height, 2.72 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	18	54	67	62	51	47	67	322	77	43	96	21
2	17	223	57	56	105	46	81	1480	64	58	50	15
3	17	122	55	53	150	45	150	895	60	34	34	13
4	16	51	132	53	68	45	101	373	97	38	30	12
5	16	36	151	47	66	45	80	232	89	72	27	12
6	15	30	146	45	54	59	106	157	103	40	24	15
7	17	27	81	49	49	77	170	132	157	31	22	15
8	18	27	66	47	49	65	124	235	95	27	20	12
9	16	25	60	45	42	68	103	170	71	24	18	11
10	18	41	54	56	43	55	301	121	65	23	18	11
11	19	39	52	63	38	49	168	103	58	21	96	10
12	18	109	47	56	37	44	115	93	52	20	54	9.5
13	18	82	48	50	37	41	125	86	48	19	29	9.3
14	19	45	44	47	39	40	443	80	44	18	22	9.1
15	18	36	47	48	44	38	591	83	56	19	19	9.3
16	18	32	242	44	50	36	192	73	56	18	18	26
17	18	30	121	42	76	35	205	70	44	18	17	33
18	17	29	75	33	59	37	221	64	39	23	17	16
19	18	29	79	36	63	53	176	73	36	83	17	20
20	23	171	98	35	73	53	185	128	35	35	16	18
21	25	150	73	36	64	47	157	86	32	33	14	108
22	20	75	62	38	65	50	116	91	29	92	15	33
23	19	108	61	54	111	48	99	131	28	35	15	19
24	19	161	83	66	77	48	87	89	24	26	14	15
25	19	74	157	55	62	49	77	80	23	21	13	15
26	19	60	152	46	51	51	72	90	22	20	13	14
27	19	55	87	39	48	84	71	73	25	18	13	14
28	20	85	135	35	47	219	78	65	282	18	13	14
29	21	163	110	38	---	133	94	73	106	83	12	13
30	21	89	72	97	---	91	202	91	43	55	18	14
31	23	---	63	88	---	76	---	77	---	113	47	---
TOTAL	579	2258	2777	1559	1718	1874	4757	5916	1960	1178	831	556.2
MEAN	18.7	75.3	89.6	50.3	61.4	60.5	159	191	65.3	38.0	26.8	18.5
MAX	25	223	242	97	150	219	591	1480	282	113	96	108
MIN	15	25	44	33	37	35	67	64	22	18	12	9.1
CFSM	.21	.86	1.02	.57	.70	.69	1.81	2.17	.74	.43	.31	.21
IN.	.25	.96	1.18	.66	.73	.79	2.01	2.50	.83	.50	.35	.24

CAL YR 1982 TOTAL 29904.0 MEAN 81.9 MAX 1310 MIN 11 CFSM .93 IN 12.66
WTR YR 1983 TOTAL 25963.2 MEAN 71.1 MAX 1480 MIN 9.1 CFSM .81 IN 10.99

04166200 EVANS DITCH AT SOUTHFIELD, MI

LOCATION.--Lat 42°27'28", long 83°16'03", in SE1/4 sec.28, T.1 N., R.10 E., Oakland County, Hydrologic Unit 04090004, on right bank 20 ft upstream from bridge on Nine Mile Road, at Southfield, 1.6 mi upstream from mouth, and 5.5 mi east of Farmington.

DRAINAGE AREA.--9.49 mi^2.

PERIOD OF RECORD.--September 1958 to current year.

GAGE.--Water-stage recorder. Datum of gage is 615.07 ft, city of Southfield datum.

REMARKS.--Records good. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--25 years, 8.24 ft^3/s,11.79 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,200 ft^3/s Oct. 1, 1981, gage height, 15.03 ft, from floodmarks, from rating curve extended above 410 ft^3/s; no flow part of each day Aug. 30, 31, 1978.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 270 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Apr. 14	1700	290	8.46	July 29	1300	327	8.81
May 2	0200	*644	*11.05	July 31	1300	276	8.42
June 28	1400	412	9.42				

Minimum discharge, 0.03 ft^3/s Sept. 27, 28, gage height, 5.78 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.9	34	4.7	4.6	3.4	3.6	4.9	42	3.8	8.3	11	1.0
2	2.5	98	3.7	4.3	26	3.5	19	237	2.9	4.9	3.7	.78
3	2.5	17	6.0	3.9	8.8	3.5	16	30	7.5	3.3	2.8	.87
4	2.8	3.2	30	3.3	4.9	3.5	8.0	18	7.8	30	3.5	.78
5	3.0	2.7	27	3.5	3.6	3.5	6.4	11	3.4	6.4	2.5	.83
6	3.5	2.4	10	3.9	3.4	12	16	10	40	3.2	2.2	3.4
7	7.1	2.1	5.7	5.1	3.3	6.5	36	11	8.3	2.7	2.0	1.1
8	2.1	2.1	4.5	3.7	3.2	8.3	11	35	4.2	2.6	1.8	.82
9	1.3	2.8	4.3	3.4	3.0	5.5	41	9.7	3.3	2.5	1.7	.79
10	1.9	6.9	3.8	7.5	2.7	4.5	34	7.8	3.3	2.4	5.1	1.1
11	1.9	11	3.4	5.9	2.5	3.8	13	6.8	2.6	2.1	33	1.0
12	1.7	20	2.7	4.2	2.3	3.3	9.2	6.3	2.4	2.2	3.5	1.0
13	1.7	3.9	2.5	3.3	2.3	3.2	23	6.0	2.3	2.0	1.8	1.4
14	2.1	2.3	2.5	3.0	2.6	3.1	107	7.6	2.3	2.3	1.5	1.4
15	2.2	1.9	10	2.8	3.3	2.9	21	6.1	12	2.3	1.8	1.4
16	2.5	2.9	44	2.6	4.8	2.6	12	4.6	3.0	1.9	1.1	9.8
17	2.7	1.9	7.5	2.3	8.7	2.7	30	4.3	2.2	1.8	1.1	1.8
18	3.2	1.7	5.6	2.1	4.6	2.8	17	4.4	2.4	22	1.3	.77
19	3.6	1.7	12	2.1	9.5	9.9	15	29	1.9	7.7	1.5	3.9
20	7.6	64	7.8	2.1	6.4	3.7	13	8.5	1.8	2.3	1.7	9.3
21	2.4	11	5.5	1.9	5.7	4.0	9.6	5.6	2.0	33	1.5	36
22	1.7	4.6	4.3	3.7	10	4.0	7.9	25	2.3	7.0	1.8	1.4
23	1.8	24	6.7	16	15	4.2	7.1	7.4	2.2	2.3	1.4	.78
24	1.7	14	15	5.3	6.3	4.4	6.1	4.8	2.2	2.0	1.4	.65
25	1.7	4.7	42	3.8	4.9	4.8	5.8	10	3.0	1.7	1.5	.67
26	1.9	5.5	11	3.0	3.9	5.7	5.5	5.0	2.9	1.6	1.5	.65
27	2.1	3.9	7.9	2.6	3.8	32	5.1	4.0	8.3	1.5	1.7	.42
28	2.0	25	23	2.4	3.8	26	15	3.6	110	2.1	1.7	.42
29	2.7	20	8.2	2.4	---	8.8	7.0	21	8.8	67	1.6	.67
30	3.0	6.3	5.8	19	---	6.6	78	6.2	9.5	10	6.6	1.8
31	10	---	5.0	5.0	---	5.6	---	5.3	---	54	2.7	---
TOTAL	88.8	401.5	332.1	138.7	162.7	198.5	599.6	593.0	268.6	295.1	108.0	86.70
MEAN	2.86	13.4	10.7	4.47	5.81	6.40	20.0	19.1	8.95	9.52	3.48	2.89
MAX	10	98	44	19	26	32	107	237	110	67	33	36
MIN	1.3	1.7	2.5	1.9	2.3	2.6	4.9	3.6	1.8	1.5	1.1	.42
CFSM	.30	1.41	1.13	.47	.61	.67	2.11	2.01	.94	1.00	.37	.31
IN.	.35	1.57	1.30	.54	.64	.78	2.35	2.32	1.05	1.16	.42	.34

CAL YR 1982 TOTAL 3359.12 MEAN 9.20 MAX 278 MIN .83 CFSM .97 IN 13.17
WTR YR 1983 TOTAL 3273.30 MEAN 8.97 MAX 237 MIN .42 CFSM .95 IN 12.83

04166300 UPPER RIVER ROUGE AT FARMINGTON, MI

LOCATION.--Lat 42°27'52", long 83°22'11", in NW1/4 sec.27, T.1 N., R.9 E., Oakland County, Hydrologic Unit 04090004, on left bank 800 ft downstream from bridge on Shiawassee Road at Farmington.

DRAINAGE AREA.--17.5 mi^2.

PERIOD OF RECORD.--March 1958 to current year.

REVISED RECORDS.--WSP 1912: 1959(M), 1960(M).

GAGE.--Water-stage recorder and concrete control. Datum of gage is 690.4 ft National Geodetic Vertical Datum of 1929.

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--35 years, 11.9 ft^3/s, 9.23 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,500 ft^3/s June 25, 1968, gage height, 8.70 ft; minimum, 0.07 ft^3/s Aug. 30, 1966, result of regulation; minimum daily, 0.32 ft^3/s Aug. 10, 1964, Aug. 29, 1966.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 120 ft^3/s and maximum (*):

Date	Time	Discharge (ft³/s)	Gage height (ft)	Date	Time	Discharge (ft³/s)	Gage height (ft)
Apr. 14	1900	166	4.34	May 2	0400	*518	*5.97

Minimum discharge, 0.82 ft^3/s Feb. 10, gage height, 2.75 ft, result of freezeup.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.6	13	11	9.5	14	8.6	14	72	14	8.2	13	3.7
2	2.4	39	9.6	9.4	51	8.3	22	326	12	8.6	7.1	2.8
3	2.3	19	10	7.8	28	8.1	36	128	13	6.1	6.2	2.5
4	2.3	7.6	20	7.6	17	8.3	25	69	26	8.2	5.4	2.4
5	2.1	5.2	27	7.6	12	8.6	19	48	18	15	4.3	2.6
6	2.1	4.0	24	7.8	9.8	14	27	35	42	8.2	3.9	2.7
7	2.2	3.7	14	8.5	8.5	17	41	30	37	5.8	3.6	2.8
8	2.5	3.3	11	8.0	8.6	17	29	51	20	4.8	3.1	2.6
9	2.1	3.5	9.3	7.8	8.3	17	33	32	15	4.2	2.8	2.3
10	2.2	6.3	8.4	11	7.4	14	59	24	12	3.9	5.1	2.1
11	2.3	8.2	7.1	13	7.0	11	35	21	9.8	3.6	26	1.9
12	2.3	21	6.9	11	6.2	10	25	18	8.6	3.6	9.7	2.0
13	2.1	11	6.2	9.4	6.0	9.5	37	16	7.4	3.6	5.7	2.0
14	2.3	6.7	5.8	8.5	5.9	9.4	117	15	6.7	3.6	4.5	2.0
15	2.4	5.2	14	8.0	7.0	8.7	89	15	6.4	2.9	3.8	2.0
16	2.2	4.7	42	7.6	9.0	8.8	45	13	6.7	2.8	3.6	5.3
17	2.3	4.2	19	7.0	14	7.7	44	13	5.8	2.8	3.4	6.1
18	2.9	3.8	13	6.5	11	7.5	44	11	5.4	6.6	3.5	4.5
19	3.0	3.6	17	6.0	13	11	40	22	4.8	7.8	3.1	4.4
20	3.5	50	17	6.0	16	10	44	25	4.4	4.4	2.9	5.3
21	3.7	24	13	6.0	16	9.4	43	17	4.2	9.7	2.7	17
22	2.8	12	11	6.5	16	9.0	31	32	4.2	14	3.2	7.1
23	2.7	21	11	8.0	22	9.0	25	29	3.9	6.3	2.9	4.6
24	2.7	26	15	11	16	9.0	21	20	4.2	4.6	2.6	3.1
25	2.7	12	38	10	12	9.0	18	19	3.4	3.7	2.6	2.7
26	2.7	9.4	26	8.6	10	9.9	16	18	3.6	2.9	2.4	2.7
27	2.7	8.2	19	7.0	9.3	35	15	14	4.5	2.9	2.3	2.4
28	2.7	15	22	6.0	8.8	53	19	12	45	3.2	2.3	2.7
29	2.9	29	16	11	---	29	21	21	20	19	2.2	2.7
30	2.9	16	12	41	---	19	65	18	11	12	2.8	2.3
31	3.4	---	10	22	---	16	---	16	---	31	5.9	---
TOTAL	80.0	395.6	485.3	305.1	369.8	421.8	1099	1200	379.0	224.0	152.6	109.3
MEAN	2.58	13.2	15.7	9.84	13.2	13.6	36.6	38.7	12.6	7.23	4.92	3.64
MAX	3.7	50	42	41	51	53	117	326	45	31	26	17
MIN	2.1	3.3	5.8	6.0	5.9	7.5	14	11	3.4	2.8	2.2	1.9
CFSM	.15	.75	.90	.56	.75	.78	2.09	2.21	.72	.41	.28	.21
IN.	.17	.84	1.03	.65	.79	.90	2.34	2.55	.81	.48	.32	.23

CAL YR 1982 TOTAL 5736.4 MEAN 15.7 MAX 200 MIN 1.5 CFSM .90 IN 12.19
WTR YR 1983 TOTAL 5221.5 MEAN 14.3 MAX 326 MIN 1.9 CFSM .82 IN 11.10

04166500 RIVER ROUGE AT DETROIT, MI

LOCATION.--Lat 42°22'20", long 83°15'20", in SW1/4 sec.27, T.1 S., R.10 E., Wayne County, Hydrologic Unit 04090004, on right bank 500 ft upstream from bridge on Plymouth Road in Detroit, and 4 mi upstream from Middle River Rouge.

DRAINAGE AREA.--187 mi^2.

PERIOD OF RECORD.--October 1930 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1034: 1933(M). WSP 1054: 1939, 1943, 1945(M). WSP 1437: 1931-32, 1934, 1936(M), 1937-38, 1944(M), 1945. WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 584.00 ft National Geodetic Vertical Datum of 1929. Prior to Oct. 16, 1948, nonrecording gage at site 1 mi downstream at datum 4.6 ft lower.

REMARKS.--Records good. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--53 years, 115 ft^3/s, 8.35 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 13,000 ft^3/s Apr. 5, 1947; maximum gage height, 23.0 ft Apr. 6, 1947, from floodmark, site and datum then in use; minimum discharge, 1.8 ft^3/s Aug. 1, 2, 1964, gage height, 3.00 ft.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 1,200 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Apr. 15	0500	1,270	12.22	May 2	2000	*3,440	*16.80

Minimum discharge, 11 ft^3/s Sept. 14, 15, gage height, 3.84 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	30	223	118	101	81	75	121	661	125	126	293	39
2	26	638	94	92	188	72	167	2380	103	122	103	26
3	27	327	89	85	319	69	322	1960	102	73	62	21
4	23	104	301	68	126	71	211	660	195	155	57	18
5	23	62	264	81	84	70	152	366	146	210	47	18
6	22	49	318	69	80	109	206	265	352	91	44	24
7	39	41	156	75	70	161	391	228	332	64	40	36
8	37	38	112	74	65	125	266	418	162	55	34	21
9	24	39	102	69	60	136	245	298	117	50	31	17
10	24	80	86	90	52	102	658	203	108	46	38	15
11	31	67	80	110	52	86	321	172	92	43	300	14
12	26	215	65	90	52	74	216	155	79	40	118	14
13	24	181	73	74	51	68	267	139	73	38	59	12
14	23	80	72	65	51	66	817	133	66	36	42	12
15	28	56	72	58	58	64	1050	142	87	37	38	12
16	25	46	468	52	69	59	391	121	100	34	33	54
17	24	43	260	50	123	58	381	110	67	33	30	81
18	23	39	134	45	104	59	442	102	57	176	29	33
19	25	37	135	43	105	105	329	184	53	395	31	35
20	39	409	182	46	134	99	343	288	50	83	27	52
21	52	373	128	47	112	77	295	145	47	65	26	311
22	33	150	102	56	111	77	231	245	43	210	24	88
23	27	163	101	107	230	76	193	264	41	75	26	39
24	25	339	157	132	157	78	172	148	37	50	23	29
25	25	144	363	88	115	78	152	147	35	41	22	24
26	25	98	332	77	83	85	139	163	32	36	20	24
27	25	95	168	60	79	202	131	118	112	33	22	24
28	27	154	271	55	75	491	174	104	490	32	21	21
29	31	351	236	52	---	257	207	169	365	214	20	20
30	39	185	135	146	---	167	530	186	135	220	22	20
31	90	---	106	172	---	135	---	128	---	353	68	---
TOTAL	942	4826	5280	2429	2886	3451	9520	10802	3803	3236	1750	1154
MEAN	30.4	161	170	78.4	103	111	317	348	127	104	56.5	38.5
MAX	90	638	468	172	319	491	1050	2380	490	395	300	311
MIN	22	37	65	43	51	58	121	102	32	32	20	12
CFSM	.16	.86	.91	.42	.55	.59	1.70	1.86	.68	.56	.30	.21
IN.	.19	.96	1.05	.48	.57	.69	1.89	2.15	.76	.64	.35	.23

CAL YR 1982 TOTAL 51353 MEAN 141 MAX 2180 MIN 15 CFSM .75 IN 10.22
WTR YR 1983 TOTAL 50079 MEAN 137 MAX 2380 MIN 12 CFSM .73 IN 9.96

04168000 LOWER RIVER ROUGE AT INKSTER, MI

LOCATION.--Lat 42°18'00", long 83°18'00", in SW1/4 SE1/4 sec.19, T.2 S., R.10 E., Wayne County, Hydrologic Unit 04090004, on right bank 10 ft downstream from bridge on John Daly Road, 0.6 mi northeast of Inkster, and 4.8 mi upstream from mouth.

DRAINAGE AREA.--83.2 mi^2.

PERIOD OF RECORD.--June 1947 to current year.

REVISED RECORDS.--WSP 1174: 1948(M). WSP 1437: 1949. WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 593.14 ft National Geodetic Vertical Datum of 1929. Prior to Oct. 20, 1948, nonrecording gage at same site and datum.

REMARKS.--Records good. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--36 years, 52.5 ft^3/s, 8.57 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,600 ft^3/s June 26, 1968, gage height, 13.62 ft; minimum, 0.2 ft^3/s Sept. 13, 1955, Jan. 23, 1961.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,750 ft^3/s May 2, gage height, 12.18 ft, from highwater mark, only peak above base of 900 ft^3/s; minimum, 1.2 ft^3/s Sept. 29; minimum gage height, 2.66 ft Aug. 30.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	5.0	78	99	47	28	38	66	410	38	39	36	3.7
2	6.4	290	67	42	76	37	93	1510	39	36	21	6.3
3	4.1	118	205	35	175	36	213	1280	41	21	8.7	4.0
4	4.6	48	246	24	61	36	151	406	53	56	8.7	2.5
5	4.9	26	255	31	42	34	91	200	45	53	9.1	2.2
6	5.5	18	111	28	34	53	130	127	133	24	7.9	18
7	10	14	74	31	30	88	351	99	119	17	4.9	20
8	6.2	12	57	30	27	86	260	226	62	12	4.0	5.5
9	6.5	19	45	26	24	107	172	159	43	11	4.0	5.2
10	5.9	30	39	36	20	74	434	92	40	7.5	4.6	5.5
11	3.6	34	30	54	17	56	218	71	39	7.1	69	4.6
12	3.2	70	30	55	15	45	125	59	28	9.5	23	2.8
13	3.0	58	23	39	14	39	146	52	25	5.5	11	2.8
14	3.0	31	25	30	14	35	581	49	22	4.9	5.5	2.2
15	3.7	21	200	25	17	33	793	43	20	4.6	4.0	1.6
16	4.9	17	253	20	20	29	258	40	19	5.2	6.3	13
17	8.9	14	104	18	46	27	229	37	14	42	5.9	11
18	11	13	69	16	53	28	255	37	13	46	4.6	5.9
19	14	12	102	14	57	41	151	78	8.7	23	6.3	11
20	22	162	100	11	109	38	114	70	8.3	8.7	4.3	35
21	9.5	163	70	12	93	35	84	47	7.5	18	3.1	79
22	11	80	52	17	90	35	67	119	6.7	20	3.4	15
23	12	83	70	34	154	30	56	97	6.7	9.5	5.2	9.9
24	8.0	178	181	31	120	32	48	62	7.5	5.2	4.9	7.5
25	14	106	439	23	78	38	42	57	6.7	4.0	4.3	2.2
26	17	55	260	19	47	48	37	51	4.9	3.4	3.4	1.4
27	22	46	147	18	42	147	33	42	45	4.3	3.4	2.2
28	9.5	61	290	15	41	505	54	35	195	6.3	2.5	1.8
29	4.4	202	171	14	---	274	52	50	100	29	2.0	1.4
30	8.9	204	86	36	---	124	246	42	44	47	4.3	1.8
31	19	---	57	51	---	82	---	41	---	92	7.5	---
TOTAL	271.7	2263	3957	882	1544	2310	5550	5688	1234.0	671.7	292.8	285.0
MEAN	8.76	75.4	128	28.5	55.1	74.5	185	183	41.1	21.7	9.45	9.50
MAX	22	290	439	55	175	505	793	1510	195	92	69	79
MIN	3.0	12	23	11	14	27	33	35	4.9	3.4	2.0	1.4
CFSM	.11	.91	1.54	.34	.66	.90	2.22	2.20	.49	.26	.11	.11
IN.	.12	1.01	1.77	.39	.69	1.03	2.48	2.54	.55	.30	.13	.13

CAL YR 1982 TOTAL 23504.6 MEAN 64.4 MAX 1380 MIN 1.7 CFSM .77 IN 10.51
WTR YR 1983 TOTAL 24949.2 MEAN 68.4 MAX 1510 MIN 1.4 CFSM .82 IN 11.16

04170000 HURON RIVER AT MILFORD, MI

LOCATION.--Lat 42°34'44", long 83°37'36", in NE1/4 sec.16, T.2 N., R.7 E., Oakland County, Hydrologic Unit 04090005, on left bank 40 ft downstream from bridge on General Motors Road, 0.5 mi downstream from Sherwood Creek, and 0.5 mi west of Milford.

DRAINAGE AREA.--132 mi^2.

PERIOD OF RECORD.--September 1948 to current year.

REVISED RECORDS.--WSP 1337: 1952(m). WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 880.00 ft National Geodetic Vertical Datum of 1929. Prior to Apr. 1, 1970 at site 240 ft upstream at same datum.

REMARKS.--Records good. Flow below about 300 ft^3/s regulated by powerplant 1.5 mi above station prior to May 20, 1957; occasional regulation for lake level control since. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--35 years, 97.7 ft^3/s, 10.05 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 648 ft^3/s Oct. 3, 1981, gage height, 7.87 ft; maximum gage height, 8.26 ft June 28, 1968; minimum daily discharge, 5.2 ft^3/s Oct. 21, 1971.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 306 ft^3/s May 4, gage height, 6.91 ft; minimum, 24 ft^3/s Aug. 18, gage height, 4.21 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983 MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	78	94	131	124	88	96	102	199	112	72	70	39
2	77	124	129	121	97	96	108	241	110	66	69	37
3	75	129	133	116	108	96	128	284	117	59	70	36
4	73	114	149	110	97	97	132	302	139	62	65	34
5	70	102	164	105	94	101	125	282	145	69	54	33
6	66	99	170	103	90	111	128	250	166	64	46	32
7	69	105	166	100	88	123	136	226	171	55	45	30
8	67	103	159	100	86	121	139	223	167	46	48	34
9	65	102	153	98	84	123	135	219	161	44	43	37
10	67	110	148	103	81	115	153	200	153	49	38	36
11	67	112	144	108	79	107	158	179	140	49	54	36
12	65	135	137	105	78	98	149	164	133	40	49	36
13	62	139	133	101	77	90	146	146	128	36	45	35
14	62	127	130	97	77	84	182	135	117	40	50	36
15	61	117	132	94	79	83	223	129	106	42	48	37
16	60	112	159	90	81	79	233	127	95	37	40	39
17	59	105	154	87	89	67	229	124	88	36	29	37
18	59	102	138	80	89	61	221	115	90	37	25	37
19	58	102	132	77	92	65	212	117	85	57	28	42
20	61	136	133	74	98	69	208	122	77	49	36	46
21	62	150	129	72	99	72	210	120	67	44	39	70
22	61	138	123	73	103	81	208	121	61	56	32	63
23	63	136	121	79	115	85	197	138	56	52	28	54
24	65	148	131	79	111	82	184	132	53	44	32	51
25	60	141	146	79	106	79	172	120	42	40	36	48
26	58	132	152	79	101	79	163	123	38	38	37	46
27	59	127	146	78	99	90	153	120	41	36	34	45
28	55	125	144	78	97	125	155	116	73	36	34	45
29	57	137	144	78	---	127	162	114	88	43	30	44
30	63	138	136	89	---	113	171	118	77	51	34	43
31	79	---	129	90	---	105	---	112	---	59	39	---
TOTAL	2003	3641	4395	2867	2583	2920	5022	5118	3096	1508	1327	1238
MEAN	64.6	121	142	92.5	92.3	94.2	167	165	103	48.6	42.8	41.3
MAX	79	150	170	124	115	127	233	302	171	72	70	70
MIN	55	94	121	72	77	61	102	112	38	36	25	30
CFSM	.49	.92	1.08	.70	.70	.71	1.27	1.25	.78	.37	.32	.31
IN.	.56	1.03	1.24	.81	.73	.82	1.42	1.44	.87	.42	.37	.35

CAL YR 1982 TOTAL 42157 MEAN 115 MAX 390 MIN 33 CFSM .87 IN 11.88
WTR YR 1983 TOTAL 35718 MEAN 97.9 MAX 302 MIN 25 CFSM .74 IN 10.07

04170500 HURON RIVER NEAR NEW HUDSON, MI

LOCATION.--Lat 42°30'45", long 83°40'35", in NE1/4 sec.1, T.1 N., R.6 E., Livingston County, Hydrologic Unit 04090005, on right bank 150 ft downstream from Kent Lake Dam, 2 mi upstream from Woodruff Creek, and 3 mi west of New Hudson.

DRAINAGE AREA.--148 mi^2.

PERIOD OF RECORD.--August 1948 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 868.00 ft National Geodetic Vertical Datum of 1929.

REMARKS.--Records good. Occasional regulation by Kent Lake. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--35 years, 112 ft^3/s, 10.28 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,080 ft^3/s Dec. 29, 1950, gage height, 5.05 ft, from rating curve extended above 600 ft^3/s; minimum, 2.6 ft^3/s May 27, 1963, gage height, 0.53 ft; minimum daily, 6.4 ft^3/s May 7, 1963.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 298 ft^3/s Nov. 5, gage height, 2.91 ft; minimum, 8.2 ft^3/s Mar. 22, gage height, 0.75 ft; minimum daily, 31 ft^3/s Aug. 19, 24.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	82	150	143	139	108	118	47	205	133	84	67	48
2	78	220	142	136	112	115	78	234	131	84	65	48
3	76	238	142	132	120	114	92	267	139	75	64	46
4	74	234	152	128	120	114	72	285	148	72	67	45
5	73	245	161	124	116	115	52	293	148	76	64	43
6	71	208	166	121	114	121	75	282	162	72	58	42
7	75	211	172	120	112	130	85	267	170	67	53	40
8	75	242	170	118	111	132	111	272	165	62	49	38
9	72	222	167	116	109	132	130	248	157	60	47	37
10	70	182	158	117	107	131	140	237	157	57	42	39
11	69	149	159	119	104	125	152	224	155	55	62	41
12	69	144	153	119	104	115	156	201	142	54	60	40
13	68	149	148	116	102	108	156	188	138	51	52	37
14	65	140	145	114	102	103	178	175	130	48	52	32
15	67	131	145	114	103	99	211	172	123	50	53	34
16	65	125	162	109	104	96	235	167	114	47	51	42
17	64	121	164	106	109	92	259	156	106	43	45	44
18	62	117	158	103	111	88	251	149	100	44	40	39
19	63	114	154	100	114	82	140	148	96	47	31	51
20	61	131	153	97	116	86	118	152	92	48	33	51
21	70	147	147	93	118	93	163	150	85	51	35	82
22	68	147	143	93	121	44	194	152	78	58	36	71
23	67	147	140	98	128	35	208	154	74	55	33	65
24	69	150	143	100	129	54	208	157	74	51	31	58
25	69	146	149	99	129	65	195	155	66	45	32	55
26	66	144	161	98	123	74	190	149	59	41	37	53
27	66	140	162	98	121	84	129	143	60	35	41	52
28	65	139	146	98	119	64	132	138	79	34	43	50
29	65	141	158	99	---	70	158	136	85	40	39	50
30	67	146	154	105	---	54	181	136	83	47	40	50
31	74	---	146	108	---	33	---	135	---	60	50	---
TOTAL	2145	4920	4763	3437	3186	2886	4496	5927	3449	1713	1472	1423
MEAN	69.2	164	154	111	114	93.1	150	191	115	55.3	47.5	47.4
MAX	82	245	172	139	129	132	259	293	170	84	67	82
MIN	61	114	140	93	102	33	47	135	59	34	31	32
CFSM	.47	1.11	1.04	.75	.77	.63	1.01	1.29	.78	.37	.32	.32
IN.	.54	1.24	1.20	.86	.80	.73	1.13	1.49	.87	.43	.37	.36

CAL YR 1982 TOTAL 46411 MEAN 127 MAX 347 MIN 34 CFSM .86 IN 11.67
WTR YR 1983 TOTAL 39817 MEAN 109 MAX 293 MIN 31 CFSM .74 IN 10.01

04172000 HURON RIVER NEAR HAMBURG, MI

LOCATION.--Lat 42°27'55", long 83°48'00", in sec.24, T.1 N., R.5 E., Livingston County, Hydrologic Unit 04090005, on right bank at downstream side of bridge on Hamburg Road, 1.1 mi north of Hamburg, and 3 mi upstream from Strawberry Lake.

DRAINAGE AREA.--308 mi^2.

PERIOD OF RECORD.--October 1951 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 850.00 ft National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Prior to Aug. 12, 1953, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period and those for period of no gage-height record, Feb. 25 to Mar. 29, which are fair. Occasional regulation by Kent Lake, 11 mi (18 km) above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--32 years, 211 ft^3/s, 9.30 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,560 ft^3/s May 15, 1956; maximum gage height, 8.46 ft June 30, 1968; minimum discharge, 32 ft^3/s July 2, 3, 1965; minimum gage height, 3.16 ft Aug. 1-3, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 771 ft^3/s May 6, gage height, 6.50 ft; minimum, 61 ft^3/s Sept. 15, gage height, 3.46 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	154	167	274	273	174	220	220	368	260	188	127	92
2	147	251	270	261	181	220	223	439	251	186	141	92
3	140	317	269	247	199	220	251	517	250	178	148	90
4	134	354	278	232	211	230	271	634	273	166	150	87
5	128	371	292	223	209	240	253	740	284	158	153	85
6	123	377	305	213	206	250	244	770	299	153	149	82
7	123	375	307	209	204	280	257	751	318	148	143	80
8	125	352	309	202	197	290	266	708	326	143	132	77
9	122	357	303	196	193	280	285	659	327	135	122	73
10	118	368	290	195	187	270	314	611	321	127	116	73
11	116	357	276	205	182	250	331	557	309	118	124	71
12	114	338	262	212	177	230	342	514	299	111	136	70
13	115	319	249	210	171	220	358	467	284	106	139	67
14	112	302	241	206	170	200	394	421	269	99	135	65
15	108	283	238	204	169	190	428	383	253	96	131	62
16	105	256	259	200	171	180	467	350	240	93	127	65
17	102	232	273	195	180	175	535	321	225	90	124	71
18	100	215	277	190	187	150	581	294	209	90	119	74
19	98	204	277	180	197	150	597	280	197	100	113	79
20	99	224	279	180	210	160	556	285	188	97	104	84
21	101	256	273	177	218	180	480	284	177	96	97	103
22	106	269	264	177	228	190	452	287	165	99	96	117
23	108	280	257	177	241	200	447	303	156	104	93	117
24	108	295	258	175	252	200	449	302	149	105	91	111
25	111	295	274	174	250	190	444	301	143	99	87	104
26	111	289	289	163	240	190	423	298	135	93	86	98
27	113	280	296	159	230	210	395	286	129	86	90	94
28	118	271	306	155	230	290	342	274	148	80	91	90
29	126	274	304	154	---	270	320	267	173	82	91	88
30	135	275	295	161	---	250	338	267	185	90	89	87
31	144	---	286	169	---	241	---	264	---	105	91	---
TOTAL	3664	8803	8630	6074	5664	6816	11263	13202	6942	3621	3635	2548
MEAN	118	293	278	196	202	220	375	426	231	117	117	84.9
MAX	154	377	309	273	252	290	597	770	327	188	153	117
MIN	98	167	238	154	169	150	220	264	129	80	86	62
CFSM	.38	.95	.90	.64	.66	.71	1.22	1.38	.75	.38	.38	.28
IN.	.44	1.06	1.04	.73	.68	.82	1.36	1.59	.84	.44	.44	.31

CAL YR 1982 TOTAL 94998 MEAN 260 MAX 921 MIN 81 CFSM .84 IN 11.47
WTR YR 1983 TOTAL 80862 MEAN 222 MAX 770 MIN 62 CFSM .72 IN 9.77

04173500 MILL CREEK NEAR DEXTER, MI

LOCATION.--Lat 42°18'00", long 83°53'55", in SW1/4 sec.18, T.2 S., R.5 E., Washtenaw County, Hydrologic Unit 04090005, on left bank 12 ft downstream from bridge on Parker Road, 2.5 mi south of Dexter, and 4 mi upstream from mouth.

DRAINAGE AREA.--128 mi^2.

PERIOD OF RECORD.--February 1952 to December 31, 1982 (discontinued).

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Altitude of gage is 850 ft from topographic map (nearest 10 ft). Prior to May 23, 1958, nonrecording gage at same site and datum.

REMARKS.--Records good. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--30 years, 79.4 ft^3/s, 8.42 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,500 ft^3/s June 26, 1968, gage height, 12.95 ft; minimum, 7.3 ft^3/s Dec. 13, 1963; minimum gage height, 4.94 ft Dec. 13, 1963, Feb. 22, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum discharge during period October to December 1982, 259 ft^3/s Dec. 25, gage height, 7.85 ft, no peak above base of 500 ft^3/s; minimum, 26 ft^3/s Oct. 4, 5, 6, gage height, 5.53 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	31	61	124									
2	30	170	108									
3	27	174	111									
4	26	117	156									
5	26	82	175									
6	26	66	176									
7	28	57	138									
8	29	53	114									
9	27	51	99									
10	28	66	85									
11	29	67	79									
12	28	114	68									
13	28	127	62									
14	28	97	57									
15	28	77	62									
16	29	67	126									
17	28	60	121									
18	28	56	98									
19	27	54	97									
20	29	136	130									
21	31	183	115									
22	31	148	98									
23	30	135	91									
24	29	183	121									
25	30	144	199									
26	30	113	245									
27	30	98	217									
28	30	95	194									
29	30	151	173									
30	31	149	155									
31	32	---	137									
TOTAL	894	3151	3931	---	---	---	---	---	---	---	---	---
MEAN	28.8	105	127	---	---	---	---	---	---	---	---	---
MAX	32	183	245	---	---	---	---	---	---	---	---	---
MIN	26	51	57	---	---	---	---	---	---	---	---	---
CFSM	.23	.82	.99	---	---	---	---	---	---	---	---	---
IN.	.26	.92	1.14	---	---	---	---	---	---	---	---	---

CAL YR 1982 TOTAL 37292 MEAN 102 MAX 1190 MIN 20 CFSM .80 IN 10.84

04174050 HURON RIVER AT DELHI MILLS, MI

LOCATION.--Lat 42°20'01", long 83°48'34", in SE1/4 sec.2, T.2 S., R.5 E., Washtenaw County, Hydrologic Unit 04090005, at bridge on Delhi Road, 5.0 mi northwest of Ann Arbor, 5.2 mi downstream from Mill Creek, 5.1 mi upstream from Barton Dam, and 60.0 mi upstream from mouth.

DRAINAGE AREA.--699 mi^2.

PERIOD OF RECORD.--Water years 1971-81, October 1982 to current year.

REMARKS.--Bimonthly samples were collected by the U.S. Geological Survey and were analyzed for pesticides and herbicides by Central Laboratory, Doraville, Georgia.

WATER QUALITY DATA, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DATE	TIME	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (STAND-ARD UNITS)	TEMPER-ATURE (DEG C)	CARBON, ORGANIC TOTAL (MG/L AS C)	PCB, TOTAL (UG/L)	ALDRIN, TOTAL (UG/L)	CHLOR-DANE, TOTAL (UG/L)	DDD, TOTAL (UG/L)	DDE, TOTAL (UG/L)	DDT, TOTAL (UG/L)
OCT 18...	1030	591	--	11.5	6.6	<.10	<.01	<.10	<.01	<.01	<.01
JAN 04...	1100	594	7.8	.5	1.4	--	--	--	--	--	--
MAR 15...	1045	606	8.0	6.0	7.3	<.10	<.01	<.10	<.01	<.01	<.01
MAY 12...	1115	553	7.7	14.0	9.0	<.10	<.01	<.10	<.01	<.01	<.01
JUL 05...	1030	558	7.9	22.5	8.3	<.10	<.01	<.10	<.01	<.01	<.01
SEP 12...	0910	609	7.9	19.5	5.4	<.10	<.01	<.10	<.01	<.01	<.01

DATE	DI-AZINON, TOTAL (UG/L)	DI-ELDRIN TOTAL (UG/L)	ENDO-SULFAN, TOTAL (UG/L)	ENDRIN, TOTAL (UG/L)	ETHION, TOTAL (UG/L)	HEPTA-CHLOR, TOTAL (UG/L)	HEPTA-CHLOR EPOXIDE TOTAL (UG/L)	LINDANE TOTAL (UG/L)	MALA-THION, TOTAL (UG/L)	METH-OXY-CHLOR, TOTAL (UG/L)	METHYL PARA-THION, TOTAL (UG/L)
OCT 18...	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01
JAN 04...	--	--	--	--	--	--	--	--	--	--	--
MAR 15...	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01
MAY 12...	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01
JUL 05...	<.01	<.01	<.01	<.01	<.01	.03	<.01	<.01	<.01	<.01	<.01
SEP 12...	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01

DATE	METHYL TRI-THION, TOTAL (UG/L)	MIREX, TOTAL (UG/L)	PARA-THION, TOTAL (UG/L)	PER-THANE TOTAL (UG/L)	TOX-APHENE, TOTAL (UG/L)	TOTAL TRI-THION (UG/L)	2,4-D, TOTAL (UG/L)	2,4,5-T TOTAL (UG/L)	SILVEX, TOTAL (UG/L)	2, 4-DP TOTAL (UG/L)
OCT 18...	<.01	<.01	<.01	<.10	<1	<.01	.05	<.01	<.01	<.01
JAN 04...	--	--	--	--	--	--	.03	<.01	<.01	<.01
MAR 15...	<.01	<.01	<.01	<.10	<1	<.01	.02	<.01	<.01	<.01
MAY 12...	<.01	<.01	<.01	<.10	<1	<.01	.04	<.01	<.01	<.01
JUL 05...	<.01	<.01	<.01	<.10	<1	<.01	.33	<.01	<.01	<.01
SEP 12...	<.01	<.01	<.01	<.10	<1	<.01	.05	<.01	<.01	<.01

04174500 HURON RIVER AT ANN ARBOR, MI

LOCATION.--Lat 42°17'10", long 83°44'00", in NW1/4 sec.28, T.2 S., R.6 E., Washtenaw County, Hydrologic Unit 04090005, on left bank 100 ft upstream from bridge on Wall Street in Ann Arbor, 0.7 mi downstream from Argo Dam, and 4.2 mi upstream from Geddes Dam.

DRAINAGE AREA.--729 mi^2.

PERIOD OF RECORD.--February 1904 to current year. Monthly discharge only for some periods published in WSP 1307. Published as "at Geddes" February 1904 to December 1914 and as "at Barton" January 1914 to September 1940.

REVISED RECORDS.--WSP 874: 1938. WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 744.81 ft National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). February 1904 to December 1914 at Geddes Dam, 4.2 mi downstream, and January 1914 to September 1947 at Barton Dam, 2.6 mi upstream, flow computed from records of operation of powerplants and records of depth of flow over dam and/or flow through undersluices.

REMARKS.--Records good. Diversion above station for Ann Arbor municipal supply had negligible effect on natural flow prior to 1955, figures of runoff adjusted since. Flow regulated by powerplants prior to May 1962. From June 1962 to 1975 occasional regulation for lake level control operations above station. Since 1975 extensive regulation of flow exists due to automation of gates at dams above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--79 years, 456 ft^3/s, 8.49 in/yr, adjusted for diversion since 1955.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 5,840 ft^3/s Mar. 14, 1918; minimum daily, 4 ft^3/s Aug. 2, Sept. 11, 1931 (plant leakage), but may be doubtful due to change in leakage.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 3,440 ft^3/s May 2, gage height, 15.75 ft; minimum daily, 68 ft^3/s Sept. 13.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	130	482	630	621	326	477	700	1340	682	358	351	114
2	170	623	594	592	395	464	665	2630	566	285	313	97
3	174	621	616	551	536	447	799	2660	607	277	205	130
4	205	584	660	515	465	453	832	2180	740	357	253	87
5	139	592	731	485	424	455	827	1870	719	310	248	118
6	230	554	758	459	405	518	805	1780	840	271	210	95
7	185	536	713	454	392	604	907	1770	888	238	227	144
8	206	566	666	435	379	700	1020	1780	882	218	201	83
9	199	976	645	419	363	847	978	1520	878	240	193	106
10	200	776	603	439	351	807	1170	1420	795	221	211	84
11	175	411	589	456	336	748	1150	1260	720	209	308	79
12	183	559	531	453	325	688	1020	1140	594	187	268	85
13	147	620	503	429	315	650	882	1130	563	225	224	68
14	173	583	476	429	308	621	1230	1030	526	190	225	73
15	159	533	476	418	310	586	1610	927	548	190	157	84
16	152	483	576	360	322	551	1430	841	581	177	167	121
17	183	451	595	376	367	515	1360	800	518	190	166	120
18	228	416	564	295	378	502	1440	658	404	222	188	125
19	137	392	568	311	380	530	1520	722	305	301	123	136
20	164	527	606	295	447	536	1620	758	291	211	147	189
21	169	622	617	307	474	537	1490	665	310	209	155	174
22	187	597	573	319	512	533	1380	782	304	246	146	215
23	185	595	554	334	555	524	977	852	309	236	148	218
24	136	666	589	324	584	496	941	818	261	194	127	185
25	195	665	740	306	563	478	844	728	260	164	132	153
26	144	622	841	319	521	456	1010	810	239	193	125	322
27	131	585	792	308	494	550	908	686	260	156	96	156
28	166	586	778	285	486	971	911	695	443	165	120	151
29	156	629	775	295	---	1130	838	712	416	223	129	93
30	151	667	711	335	---	1210	1020	817	332	244	108	78
31	199	---	671	348	---	851	---	747	---	316	118	---
TOTAL	5358	17519	19741	12272	11713	19435	32284	36528	15781	7223	5789	3883
MEAN	173	584	637	396	418	627	1076	1178	526	233	187	129
MAX	230	976	841	621	584	1210	1620	2660	888	358	351	322
MIN	130	392	476	285	308	447	665	658	239	156	96	68
MEAN +	193	603	654	414	436	645	1095	1197	549	258	211	153
CFSM +	.26	.83	.90	.57	.60	.88	1.50	1.64	.75	.35	.29	.21
IN +	.31	.92	1.03	.66	.62	1.02	1.68	1.89	.84	.41	.33	.23

CAL YR 1982 TOTAL 205100 MEAN 562 MAX 3080 MIN 93 MEAN + 582 CFSM + .80 IN + 10.84
WTR YR 1983 TOTAL 187526 MEAN 514 MAX 2660 MIN 68 MEAN + 534 CFSM + .73 IN + 9.95

+ Adjusted for diversion for municipal supply; record furnished by City of Ann Arbor.

04174800 HURON RIVER AT YPSILANTI, MI

LOCATION.--Lat 42°14'57", long 83°36'45", in SW1/4 sec.4, T.3 S., R.7 E., Washtenaw County, Hydrologic Unit 04090005, on left bank 30 ft downstream from bridge on Forest Avenue in Ypsilanti, 4.9 mi downstream from Geddes Dam, 5.6 mi upstream from Ford Dam, and at mile 42.8.

DRAINAGE AREA.--807 mi^2.

PERIOD OF RECORD.--June 1974 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 700 ft from topographic map (nearest 5 ft).

REMARKS.--Records good except those for periods of no gage-height record, Dec. 7 to Jan. 10, Aug. 19 to Sept. 15, which are poor. Considerable regulation caused by many dams above station; storage capacity is small. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--9 years, 583 ft^3/s, 9.81 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,500 ft^3/s May 2, 1983, gage height, 12.64 ft; minimum daily, 64 ft^3/s Sept. 4, 1978.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 4,500 ft^3/s May 2, gage height, 12.64 ft; minimum daily, 65 ft^3/s Sept. 30; minimum gage height, 6.76 ft Sept. 30.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	240	634	750	760	434	585	815	1480	782	468	411	130
2	250	1000	744	740	625	591	820	3820	663	323	371	120
3	300	772	737	700	688	540	945	3060	711	372	274	160
4	200	710	833	650	637	572	976	2370	811	504	310	110
5	330	708	928	600	545	549	933	1930	793	393	269	140
6	270	674	927	580	511	672	966	1800	983	308	317	120
7	287	638	860	560	510	735	1110	1800	1010	327	290	170
8	283	635	840	540	503	880	1160	1800	946	290	244	110
9	260	1050	800	520	464	958	1110	1540	936	295	261	130
10	286	922	780	560	429	963	1340	1480	881	279	237	100
11	268	572	750	564	458	807	1290	1340	882	268	488	100
12	253	730	680	602	420	809	1140	1180	675	269	353	100
13	233	767	640	566	410	761	1050	1220	639	246	310	85
14	275	709	620	540	393	700	1800	1070	610	244	262	100
15	232	678	600	530	414	699	1970	1010	658	262	239	120
16	233	589	720	460	419	667	1620	910	666	238	251	180
17	244	578	740	460	484	564	1530	871	606	281	197	160
18	280	533	720	370	511	607	1560	734	539	241	256	146
19	243	517	720	380	534	638	1620	824	348	371	160	159
20	267	783	760	393	574	639	1700	837	369	326	180	192
21	238	814	780	400	637	663	1580	769	327	265	180	353
22	242	734	730	407	640	617	1470	893	371	311	180	264
23	249	782	700	429	721	625	1110	945	338	272	170	272
24	270	830	740	439	723	594	1040	899	311	228	160	179
25	231	772	950	413	689	584	928	823	322	242	160	212
26	209	736	1050	405	632	529	1100	882	313	198	150	355
27	225	665	1000	387	634	725	985	765	275	209	120	198
28	226	744	980	377	594	1240	1070	737	660	250	150	189
29	217	799	960	386	---	1260	951	819	520	273	160	161
30	236	796	940	473	---	1290	1200	889	419	397	130	65
31	307	---	850	482	---	950	---	825	---	438	145	---
TOTAL	7884	21871	24829	15673	15233	23013	36889	40322	18364	9388	7385	4880
MEAN	254	729	801	506	544	742	1230	1301	612	303	238	163
MAX	330	1050	1050	760	723	1290	1970	3820	1010	504	488	355
MIN	200	517	600	370	393	529	815	734	275	198	120	65
CFSM	.32	.90	.99	.63	.67	.92	1.52	1.61	.76	.38	.30	.20
IN.	.36	1.01	1.14	.72	.70	1.06	1.70	1.86	.85	.43	.34	.22

CAL YR 1982 TOTAL 239207 MEAN 655 MAX 3230 MIN 110 CFSM .81 IN 11.03
WTR YR 1983 TOTAL 225731 MEAN 618 MAX 3820 MIN 65 CFSM .77 IN 10.41

04176500 RIVER RAISIN NEAR MONROE, MI
(National stream-quality accounting network station)

LOCATION.--Lat 41°57'38", long 83°31'52", Monroe County, Hydrologic Unit 04100002, on left bank 0.8 mi downstream from bridge on Ida Maybee Road, 5.0 mi downstream from Saline River, and 7.5 mi west of Monroe.

DRAINAGE AREA.--1,042 mi^2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--September 1937 to current year. Published as "Raisin River at Monroe" 1937-52 and as "River Raisin at Monroe" 1952-53.

REVISED RECORDS.--WSP 954: 1938-40(M), 1941. WSP 1437: 1939, 1948. WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 616.26 ft National Geodetic Vertical Datum of 1929. Prior to Oct. 1, 1953, at site 9 mi downstream at datum 46.26 ft lower.

REMARKS.--Water-discharge records good. Diurnal fluctuation caused by powerplants above station prior to June 27, 1968.

AVERAGE DISCHARGE.--46 years, 722 ft^3/s, 9.41 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 15,300 ft^3/s Mar. 16, 1982, gage height, 10.4 ft; maximum gage height, 11.16 ft Mar. 15, 1982, backwater from ice; minimum discharge, about 2 ft^3/s Sept. 4, 1938, Sept. 19, 20, 1941, site then in use.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 3,500 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Apr. 15	0800	5,330	7.42	May 3	1600	*8,600	*9.12

Minimum discharge, 108 ft^3/s Sept. 16, 17, 19, gage height, 2.12 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	213	201	1780	1700	541	621	2150	2330	774	3020	414	155
2	201	511	1690	1280	642	590	1780	5150	718	2980	451	142
3	195	906	1510	1030	1220	562	1870	8330	679	2470	480	138
4	212	1050	1890	895	1250	541	1990	7870	656	1580	492	136
5	195	983	2240	800	1240	523	2040	7620	635	1210	399	132
6	179	834	2590	725	905	522	2100	6110	673	1020	319	133
7	177	676	2360	688	730	554	2690	4420	807	817	285	132
8	174	580	2160	644	640	687	2640	3410	899	659	251	137
9	172	525	1850	608	520	1090	2460	2790	851	545	240	141
10	176	468	1440	607	460	1340	3030	2290	756	458	226	132
11	195	449	1140	685	400	1560	2790	1990	689	432	324	124
12	196	462	960	729	370	1530	2660	1760	628	400	350	122
13	184	503	832	707	345	1280	2660	1510	601	362	405	123
14	182	543	728	684	370	1020	3830	1330	580	334	402	116
15	179	550	672	580	426	859	5060	1210	548	302	317	112
16	170	550	1140	490	435	751	4490	1100	498	274	282	112
17	167	518	1590	370	576	670	4700	1000	454	255	295	109
18	165	482	1530	320	703	616	4150	925	407	273	238	113
19	161	443	1480	345	869	597	3210	901	365	626	222	116
20	168	548	1390	370	1070	587	2450	972	341	424	204	123
21	185	921	1320	400	1140	560	1930	1010	343	362	196	142
22	202	1100	1220	435	1180	540	1620	1070	331	363	187	150
23	185	1160	1110	472	1190	540	1400	1440	319	332	178	175
24	166	1410	1290	470	1130	540	1240	1510	291	313	174	178
25	159	1370	1930	471	1020	560	1120	1540	273	265	171	179
26	164	1250	2840	460	879	603	1030	1350	261	252	164	176
27	168	1130	2520	430	759	833	952	1080	281	244	160	180
28	165	1040	3080	400	672	2110	898	923	1400	224	160	177
29	148	1680	3100	400	---	2240	889	855	2910	216	163	166
30	131	1850	2650	425	---	2360	1220	8[illegible]	2640	225	158	159
31	151	---	2190	522	---	2380	---	835	---	294	162	---
TOTAL	5485	24693	54222	19142	21682	29766	71049	75474	21608	21531	8469	4230
MEAN	177	823	1749	617	774	960	2368	2435	720	695	273	141
MAX	213	1850	3100	1700	1250	2380	5060	8330	2910	3020	492	180
MIN	131	201	672	320	345	522	889	835	261	216	158	109
CFSM	.17	.79	1.68	.59	.74	.92	2.27	2.34	.69	.67	.26	.14
IN.	.20	.88	1.94	.68	.77	1.06	2.54	2.69	.77	.77	.30	.15

CAL YR 1982 TOTAL 366454 MEAN 1004 MAX 14600 MIN 110 CFSM .96 IN 13.08
WTR YR 1983 TOTAL 357351 MEAN 979 MAX 8330 MIN 109 CFSM .94 IN 12.76

04176500 RIVER RAISIN NEAR MONROE, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1966-72, 1978 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: April 1978 to September 1981.
WATER TEMPERATURES: March 1966 to September 1972, April 1978 to September 1981.
SUSPENDED SEDIMENT DISCHARGE: March 1966 to September 1972.

INSTRUMENTATION.--Water-quality monitor Mar. 23 to July 13, 1981.

REMARKS.--Quarterly samples collected at gaging station or at bridge .8 mi upstream on Ida Maybee Road.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum daily, 1,020 micromhos Feb. 16, 1979; minimum daily recorded (water years 1978-81), 263 micromhos Jan. 25, 1981.
WATER TEMPERATURES: Maximum daily recorded (water years 1967, 1970-1972, 1978-80), 32.0°C July 18, 1972; minimum daily, 0.0°C on many days during winter periods.
SEDIMENT CONCENTRATIONS: Maximum daily 1,430 mg/L Dec. 22, 1967; minimum daily, 1 mg/L on several days in 1969 and 1970.
SEDIMENT LOADS: Maximum daily, 28,000 tons Dec. 22, 1967; minimum daily, 0.29 tons Aug. 31, 1971.

WATER QUALITY DATA, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (STAND-ARD UNITS)	TEMPER-ATURE (DEG C)	TUR-BID-ITY (NTU)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)
NOV 08...	1430	573	657	7.7	8.5	15	--	--	K110	490
MAR 08...	1330	688	672	7.8	10.0	9.1	10.3	95	210	450
MAY 17...	1230	1020	562	8.4	14.5	15	11.0	109	150	E210
AUG 29...	1415	167	694	8.6	28.0	3.9	11.4	149	K110	3700

DATE	HARD-NESS (MG/L AS CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	PERCENT SODIUM	SODIUM AD-SORP-TION RATIO	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	ALKA-LINITY LAB (MG/L AS CACO3)	CARBON DIOXIDE DIS-SOLVED (MG/L AS CO2)
NOV 08...	317	92	21	15	9	.4	4.5	193	7.4
MAR 08...	307	88	21	18	11	.5	7.0	210	6.4
MAY 17...	262	75	18	13	0	.4	2.5	206	1.6
AUG 29...	305	84	23	31	18	.8	7.2	221	1.1

DATE	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER AC-FT)	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)
NOV 08...	97	36	.2	9.6	410	392	.56	634	2.7
MAR 08...	98	40	.2	4.2	469	403	.64	871	2.8
MAY 17...	54	26	.2	3.3	354	316	.48	975	1.9
AUG 29...	86	45	.3	9.8	491	420	.67	221	.46

04176500 RIVER RAISIN NEAR MONROE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DATE	NITROGEN, AMMONIA DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS, DISSOLVED (MG/L AS P)	PHOSPHORUS, ORTHO, DISSOLVED (MG/L AS P)	PHOSPHATE, ORTHO, DISSOLVED (MG/L AS PO4)	SEDIMENT, SUSPENDED (MG/L)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
NOV 08...	.090	.80	.140	.080	.060	.18	20	31	100
MAR 08...	.130	.80	.100	.060	.060	.18	27	50	92
MAY 17...	.010	.90	.100	.050	.030	.09	26	72	100
AUG 29...	.020	.60	.120	.080	.060	.18	19	8.6	100

DATE	TIME	ALUMINUM, DISSOLVED (UG/L AS AL)	ARSENIC DISSOLVED (UG/L AS AS)	BARIUM, DISSOLVED (UG/L AS BA)	BERYLLIUM, DISSOLVED (UG/L AS BE)	CADMIUM DISSOLVED (UG/L AS CD)	CHROMIUM, DISSOLVED (UG/L AS CR)	COBALT, DISSOLVED (UG/L AS CO)	COPPER, DISSOLVED (UG/L AS CU)	IRON, DISSOLVED (UG/L AS FE)	LEAD, DISSOLVED (UG/L AS PB)
NOV 08...	1430	40	1	79	<1	<1	<1	<3	4	41	<1
MAR 08...	1330	<10	1	64	<1	<1	<1	<3	2	5	6
MAY 17...	1230	<10	1	56	1	1	<1	3	3	15	<1
AUG 29...	1415	40	3	89	<1	<1	3	<3	3	7	1

DATE	LITHIUM DISSOLVED (UG/L AS LI)	MANGANESE, DISSOLVED (UG/L AS MN)	MERCURY DISSOLVED (UG/L AS HG)	MOLYBDENUM, DISSOLVED (UG/L AS MO)	NICKEL, DISSOLVED (UG/L AS NI)	SELENIUM, DISSOLVED (UG/L AS SE)	SILVER, DISSOLVED (UG/L AS AG)	STRONTIUM, DISSOLVED (UG/L AS SR)	VANADIUM, DISSOLVED (UG/L AS V)	ZINC, DISSOLVED (UG/L AS ZN)
NOV 08...	5	16	.2	<10	3	<1	--	530	<6.0	5
MAR 08...	6	34	.2	10	8	<1	<1	450	<6.0	<3
MAY 17...	4	7	.1	10	1	1	<1	260	6.0	6
AUG 29...	21	5	.1	<10	5	<1	<1	630	<6.0	7

As the number of streams on which streamflow information is likely to be desired far exceeds the number of stream-gaging stations feasible to operate at one time, the Geological Survey collects limited stream-flow data at sites other than stream-gaging stations. When limited streamflow data are collected on a systematic basis over a period of years for use in hydrologic analyses, the site at which the data are collected is called a partial-record station. Data collected at these partial-record stations are useable in low-flow or floodway analyses, depending on the type of data collected. In addition, discharge measurements are made at other sites not included in the partial-record program. These measurements are generally made in time of drought or flood to give better areal coverage to those events. Those measurements and others collected for some special reason are called measurements at miscellaneous sites.

Records collected at partial-record stations are presented in two tables. The first is a table of discharge measurements at low-flow partial-record stations and the second is a table of annual maximum stage and discharge at crest-stage stations. Discharge measurements made at miscellaneous sites for both low flow and high flow are given in a third table.

Low-flow partial-record stations

Measurements of streamflow in the area covered by this report made at low-flow partial-record stations are given in the following table. These measurements were made during periods of base flow when streamflow is primarily from ground-water storage. These measurements, when correlated with the simultaneous discharge of a nearby stream where continuous records are available, will give a picture of the low-flow potentiality of a stream. The column headed "Period of record" shows the water years in which measurements were made at the same, or practically the same, site.

Discharge measurements made at low-flow partial-record stations during water year 1983

Station No.	Station name	Location	Drainage area (mi²)	Period of Record	Measurements Date	Measurements Discharge (ft³/s)
		Streams tributary to Lake Michigan				
04057580	Whitefish River near Rapid River, MI	Lat 45°57'56", long 86°55'15", in SE¼ NW¼ sec.10, T.41 N., R.21 W., Delta County, about 800 ft downstream from Chippeny Creek and 3.5 miles northeast of Rapid River.	284	1973-83	12-16-82 03-30-83 06-23-83 08-09-83	264 351 201 77.4
04058120	Green Creek near Palmer, MI	Lat 46°22'22", long 87°36'21", in NW¼ sec.19, T.46 N., R.26 W., Marquette County, at bridge on County Highway 565, 4.5 miles south of Palmer.	d8.42	1961-65, 1970-83	10-06-82 03-08-83 06-28-83 09-07-83	b4.94 b15.0 b14.3 b2.61
04059034	Escanaba River near Wells, MI	Lat 45°48'22", long 87°05'51", in SW¼ NW¼ sec. 1, T.39 N., R.23 W., Delta County, 600 ft downstream from Bichler Creek, 2.5 miles upstream from mouth and 2.0 miles northwest of Wells.	a920	1981-83	12-16-82 03-01-83 06-21-83 07-19-83	c592 c558 c733 c390
04096517	Hog Creek tributary near Allen, MI	Lat 41°57'33", long 84°49'33", in SW¼ SW¼ sec.7, T.6 S., R.4 W., Hillsdale County, at Squires Road, 0.3 mile upstream from mouth, 3.0 miles west of Allen.	2.61	1969-83	10-26-82 05-24-83 07-05-83 08-16-83	.84 3.34 1.01 .90
04114594	Maple River near St. Johns, MI	Lat 43°02'43", long 84°28'11", in SE¼ SE¼ sec.30, T.8 N., R.1 W., Clinton County, at bridge on Colony Road, and 4.5 miles northeast of St. Johns.		1981-83	10-07-82 03-07-83 03-24-83	18.9 b112 128
04119061	Plaster Creek at Wyoming, MI	Lat 42°56'15", long 85°41'24", NE¼ sec.2, T.6 N., R.12 W., Kent County, at Godfrey St., at Wyoming.	57.1	1974-83	10-05-82 11-15-82 02-08-83	16.0 46.0 29.7
*04120295	Black Creek near Muskegon, MI	Lat 43°12'14", long 86°09'52", in NE¼ NW¼ sec.1, T.9 N., R.16 W., Muskegon County, at bridge on Mill Iron Road, 4.8 miles east of Muskegon, and 4.9 miles upstream from mouth.	a39	1974-83	10-26-82 12-07-82 06-28-83 07-14-83	37.4 b230 49.3 32.8
		Streams tributary to Lake Huron				
04146450	North Branch Flint River near Columbiaville, MI	Lat 43°11'18", long 83°22'03", in NW¼ sec.24, T.9 N., R.9 E., Lapeer County, on downstream side of bridge on Barnes Lake Road.	223	1979-83	10-06-82 03-16-83 06-09-83 07-21-83 09-01-83	41.4 123 133 b34.4 30.2

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* Also a crest-stage station.
a Approximately.
b Not base flow.
c Affected by diversion for industrial use.
d Since 1970, affected by diversion for industrial use.

Crest-stage partial-record stations

The following table contains annual maximum discharge for crest-stage stations. A crest-stage gage is a device which will register the peak stage occurring between inspections of the gage. A stage-discharge relation for each gage is developed from discharge measurements made by indirect measurements of peak flow or by current meter. The date of the maximum discharge is not always certain, but is usually determined by comparison with nearby continuous-record stations, weather records, or local inquiry. Only the maximum discharge for each water year is given. Information of some lower floods may have been obtained but is not published herein. The years given in the period of record represent water years for which the annual maximum has been determined.

Annual maximum discharge at crest-stage partial-record stations during water year 1983

					Annual maximum		
Station No.	Station name	Location	Drainage area (mi²)	Period of record	Date	Gage height (feet)	Discharge (ft³/s)
		Streams tributary to Lake Superior					
04041000	Perch River near Sidnaw, MI	Lat 46°31'06", long 88°39'48", in NE¼ sec.34, T.48 N., R.35 W., Baraga County, at State Highway 28, 2.5 miles east of Sidnaw.	63.1	1913-15‡, 1957-83	04-28-83	8.95	305
04044200	Carp Creek at Ishpeming, MI	Lat 46°29'11", long 87°41'21", in NW¼ sec.9, T.47 N., R.27 W., Marquette County, at bridge on Highway 41A, at Ishpeming.	16.5	1970-83	05-30-83	8.45	223
04044813	Two Hearted River near Paradise, MI	Lat 46°41'57", long 85°25'19", in NW¼ SW¼ sec.27, T.50 N., R.9 W., Luce County, at foot bridge in State Forest Campground, 0.4 mile upstream from mouth, and 18 miles northwest of Paradise.	201	1973-83	04-17-83	b7.35	880
04045538	West Branch Waiska River near Brimley, MI	Lat 46°21'18", long 84°35'35", in SW¼ NW¼ sec.29, T.46 N., R.2 W., Chippewa County, at bridge on county road, 3.2 miles upstream from mouth, and 3.5 miles south of Brimley.	40.7	1973-83	04-15-83	6.86	412
04045559	East Branch Waiska River near Brimley, MI	Lat 46°25'07", long 84°28'24", in NW¼ NE¼ sec.6, T.46 N., R.1 W., Chippewa County, at bridge on county road, 4.0 miles upstream from mouth, and 4.7 miles east of Brimley.	31.9	1973-83	04-15-83	c10.83	536
		Streams tributary to Lake Michigan					
04046000	Black River near Garnet, MI	Lat 46°07'05", long 85°21'55", in SE¼ sec.13, T.43 N., R.9 W., Mackinac County, on right bank 10 ft upstream from footbridge, 15 feet downstream from Peters Creek, 3.5 miles upstream from Lake Michigan and 4 miles southwest of Garnet.	28.0	1951-78‡, 1979-83	04-15-83	4.82	188
04057900	Black River near Republic, MI	Lat 46°25'08", long 87°53'21", in NE¼ sec.2, T.46 N., R.29 W., Marquette County, at bridge on county road, 4.4 miles east of Republic.	34.4	1961-68‡, 1970-83	05-31-83	3.98	326
04058400	Goose Lake Outlet near Sands Station, MI	Lat 46°23'36", long 87°29'40", in SE¼ SE¼ sec.12, T.46 N., R.26 W., Marquette County, on left bank, 0.8 mile upstream from mouth, and 3.0 miles west of Sands Station.	37.5	1965-82‡, 1983	05-31-83	5.17	306
04059400	Tenmile Creek at Perronville, MI	Lat 45°48'38", long 87°22'00", in NW¼ NW¼ sec.2, T.39 N., R.25 W., Delta County, 1 mile northwest of Perronville.	38.4	1971-77‡, 1978-83	04-14-83	d4.35	342
04062300	Michigamme River at Republic, MI	Lat 46°23'03", long 87°58'48", in SE¼ sec.18, T.46 N., R.29 W., Marquette County, on left bank 400 feet upstream from county highway bridge, 0.3 mile upstream from Trout Falls Creek, and 0.6 mile south of Republic.	240	1961-75‡, 1976-83	06-02-83	5.45	2,040
04096272	Beebe Creek near Hillsdale, MI	Lat 41°57'15", long 84°38'20", in NE¼ NE¼ sec.15, T.6 S., R.3 W., Hillsdale County, 20 feet upstream from bridge on Moore Road, 1.2 miles northwest of Hillsdale.	42.4	1975-78‡, 1979-83	05-03-83	6.55	390
04096340	St. Joseph River at Clarendon, MI	Lat 42°07'51", long 84°51'56", in SW¼ SW¼ sec.11, T.4 S., R.5 W., Calhoun County, on left bank 5 feet upstream from bridge on 22 Mile Road at Clarendon.	144	1975-77‡, 1978-83	05-08-83	7.13	592
04097170	Portage River near Vicksburg, MI	Lat 42°06'53", long 85°29'08", in SW¼ sec.16, T.4 S., R.10 W., Kalamazoo County, on right bank 15 feet upstream from bridge on W Ave., 2.4 miles east of Vicksburg.	68.2	1947-51‡, 1965-79‡, 1980-83	05-03-83	4.75	123
04108645	Rabbit River at Hamilton, MI	Lat 42°40'31", long 86°00'13", in NE¼ sec.6, T.3 N., R.14 W., Allegan County, at bridge on State Highway 40, at Hamilton.	274	1979-83	12-26-82	15.12	1,580

See footnotes at end of table.

Annual maximum discharge at crest-stage partial-record stations during water year 1983--Continued

Station No.	Station name	Location	Drainage area (mi²)	Period of record	Annual maximum Date	Annual maximum Gage height (feet)	Annual maximum Dis-charge (ft³/s)
		Streams tributary to Lake Michigan--Continued					
04112700	Sycamore Creek near Mason, MI	Lat 42°36'38", long 84°27'58", in NE¼ NE¼ sec.31, T.3 N., R.1 W., Ingham County, at bridge on Harper Road, 0.7 mile downstream from Aurelius and VeVoy Drain, and 2.6 miles northwest of Mason.	39.5	1975-83	05-02-83	9.31	267
04113090	Carrier Creek near Grand Ledge, MI	Lat 42°43'36", long 84°39'16", in SE¼ SW¼ sec.15, T.4 N., R.3 W., Eaton County, at bridge on St. Joe Highway, 3.7 miles upstream from mouth, and 4.0 miles southeast of Grand Ledge.	7.18	1975-83	05-02-83	5.57	122
04117000	Quaker Brook Near Nashville, MI	Lat 42°33'57", long 85°05'37", in NW¼ sec.13, T.2 N., R.7 W., Barry County, on left bank 150 feet upstream from culvert on county road, 500 feet upstream from small tributary, and 2.5 miles south of Nashville.	7.60	1955-75‡, 1976-83	05-02-83	5.35	203
04119055	Plaster Creek at Grand Rapids, MI	Lat 42°54'46", long 85°39'02", in SE¼ sec.7, T.6 N., R.11 W., Kent County, on right downstream side of bridge on 28th Street, at Grand Rapids.	46.6	1974-83	12-03-82	9.39	868
04119160	Buck Creek at Grandville, MI	Lat 42°54'09", long 85°45'46", in SE¼ sec.18, T.6 N., R.12 W., Kent County, on right downstream side of bridge on Wilson Avenue, at Grandville.	50.5	1974-83	12-03-82	8.55	790
*04120295	Black Creek near Muskegon, MI	Lat 43°12'14", long 86°09'52", in NW¼ NW¼ sec.1, T.9 N., R.16 W., Muskegon County, at bridge on Mill Iron Road, 4.8 miles east of Muskegon.	a39	1974-83	12-03-82	4.01	274
04122025	Muskegon River at Bridgeton, MI	Lat 43°20'50", long 85°56'22", in SE¼ NE¼ sec.14, T.11 N., R.14 W., Newaygo County, at bridge on Warner Road, in Bridgeton.	a2,400	1979-83	12-05-82	14.55	6,740
04122223	Pentwater River near Hart, MI	Lat 43°43'27", long 86°22'36", in NW¼ SW¼ sec.5, T.15 N., R.17 W., Oceana County, at culverts on county road, 0.8 mile downstream from hydroelectric plant on Hart Lake, 1.8 miles northwest of Hart.	76.6	1975-83	07-31-83	3.95	348
04122230	North Branch Pentwater River near Pentwater, MI	Lat 43°47'42", long 86°21'30", in NE¼ SE¼ sec.8, T.16 N., R.17 W., Oceana County, at bridge on U.S. Highway 31, 3.5 miles northeast of Pentwater.	42.3	1975-83	12-04-82	2.92	247
04124500	East Branch Pine River near Tustin, MI	Lat 44°06'09", long 85°31'02", in NE¼ NW¼ sec.28, T.20 N., R.10 W., Osceola County, 75 feet downstream from highway bridge, 3.0 miles west of Tustin.	a63	1953-63‡, 1964-83	12-04-82	4.59	310
04126600	Betsie River near Benzonia, MI	Lat 44°36'02", long 86°05'57", in NW¼ NW¼ sec.2, T.25 N., R.15 W., Benzie County, at bridge on U.S. Highway 31, 1.2 miles south of Benzonia.	a170	1975-83	12-06-82	2.70	528
04127850	Boyne River near Boyne City, MI	Lat 45°11'48", long 84°57'26", in NW¼ SW¼ sec.5, T.32 N., R.5 W., Charlevoix County, at culvert on Dam Road, 0.3 mile downstream from nonoperative hydroelectric plant, 2.8 miles southeast of Boyne City.	64.2	1975-83	09-18-78 03-31-79 04-09-80 04-04-81 05-07-83	3.47 4.15 3.34 4.44 3.80	e314 e422 e294 e478 365
		Streams tributary to Lake Huron					
04139000	Houghton Creek near Lupton, MI	Lat 44°23'45", long 84°02'50", in SE¼ SE¼ sec.10, T.23 N., R.3 E., Ogemaw County, 2.7 miles southwest of Lupton.	29.7	1950-72‡, 1973-83	04-15-83	6.26	444
04140200	Klacking Creek near Selkirk, MI	Lat 44°20'05", long 84°08'46", in NE¼ NE¼ sec.2, T.22 N., R.2 E., Ogemaw County, at bridge on Campbell Road, 4.0 miles northwest of Selkirk.	7.51	1953-83	04-15-83	1.86	99
04140500	Rifle River at Selkirk, MI	Lat 44°18'48", long 84°04'10", in SE¼ NE¼ sec.9, T.22 N., R.3 E., Ogemaw County, at bridge on State Road, at Selkirk.	117	1950-82‡, 1983	04-15-83	a4.51	f1,140

See footnotes at end of table.

Annual maximum discharge at crest-stage partial-record stations during water year 1983--Continued

Station No.	Station name	Location	Drainage area (mi²)	Period of record	Annual maximum Date	Gage height (feet)	Discharge (ft³/s)
		Streams tributary to Lake Huron--Continued					
04141000	South Branch Shepards Creek near Selkirk, MI	Lat 44°18'28", long 84°05'13", in SE¼ SE¼ sec.8, T.22 N., R.3 E., Ogemaw County, on right bank 200 feet upstream from mouth, 600 feet west of bridge on Bedtelyon Road, and 1.1 miles southwest of Selkirk.	1.15	1951-78‡, 1979-83	04-15-83	3.21	43
04144180	Jones Creek near Gaines, MI	Lat 42°53'02", long 83°52'27", in SE¼ sec.28, T.6 N., R.5 E., Genesee County, at bridge on Baldwin Road, 1.7 miles northeast of Gaines.	7.60	1970-83	05-02-83	5.45	67
04144200	Porter Drain near Gaines, MI	Lat 42°53'26", long 83°50'59", in SE¼ sec.27, T.6 N., R.5 E., Genesee County, at bridge on Seymour Road, 3.2 miles east of Gaines.	4.68	1970-83	05-02-83	3.24	40
04144220	Jones Creek at Duffield, MI	Lat 42°54'45", long 83°54'27", in SE¼ sec.17, T.6 N., R.5 E., Genesee County, at bridge on Grand Blanc Road, 1.0 mile south of Duffield.	23.4	1970-83	05-02-83	7.47	285
04146020	South Branch Flint River near Millville, MI	Lat 43°04'44", long 83°18'25", in SW¼ sec.29, T.8 N., R.10 E., Lapeer County, on downstream right wingwall of bridge on Saginaw Road, 1.6 miles north of Lapeer.	160	1974-83	05-02-83	<6.90	<470
04147800	Powers-Cullen Drain near Genesee, MI	Lat 43°05'33", long 83°33'31", in SW¼ sec.18, T.8 N., R.8 E., Genesee County, at bridge on Coldwater Road, 3.3 miles southeast of Genesee.	9.17	1970-83	05-02-83	2.66	108
04147900	Lefler-Scothan Drain near Otisville, MI	Lat 43°08'11", long 83°32'27", in NE¼ sec.5, T.8 N., R.8 E., Genesee County, at bridge on Frances Road, 2.2 miles south of Otisville.	4.90	1970-83	05-02-83	4.57	58
04148120	Kearsley Creek near Atlas, MI	Lat 42°57'15", long 83°32'42", in NE¼ sec.5, T.6 N., R.8 E., Genesee County, at bridge on Jordan Road, 1.2 miles north of Atlas.	55.6	1970-83	04-14-83	6.73	189
04148139	Black Creek near Davison, MI	Lat 43°01'28", long 83°33'24", in SE¼ sec.7, T.7 N., R.8 E., Genesee County, at bridge on Irish Road, 2.0 miles west of Davison.	22.8	1970-83	05-02-83	5.69	173
04148144	Chipmunk Creek near Genesee, MI	Lat 43°04'01", long 83°36'59", in SE¼ sec.27, T.8 N., R.7 E., Genesee County, at culvert on Genesee Road, 3.1 miles south of Genesee.	5.49	1970-83	05-02-83	3.71	126
04148200	Swartz Creek near Holly, MI	Lat 42°49'39", long 83°37'42", in SW¼ sec.15, T.5 N., R.7 E., Oakland County, on right bank 25 feet downstream from bridge on Elliot Road, 2.4 miles north of Holly.	12.1	1956-75‡, 1976-83	05-02-83	2.85	42
04148255	Swartz Creek near Grand Blanc, MI	Lat 42°53'09", long 83°41'29", in SE¼ sec.25, T.6 N., R.6 E., Genesee County, at bridge on Baldwin Road, 4.1 miles southwest of Grand Blanc.	36.0	1970-83	05-02-83	4.16	70
04148260	Swartz Creek near Swartz Creek, MI	Lat 43°58'22", long 83°45'43", in SW¼ sec.28, T.7 N., R.6 E., Genesee County, at bridge on Bristol Road, 3.9 miles east of Swartz Creek.	67.3	1970-83	05-02-83	5.91	314
04148265	Kimball Drain near Swartz Creek, MI	Lat 42°55'15", long 83°49'51", in NE¼ sec.14, T.6 N., R.5 E., Genesee County, at bridge on Morrish Road, 2.4 miles south of Swartz Creek.	10.6	1970-83	05-02-83	4.90	123
04148270	West Branch Swartz Creek near Swartz Creek, MI	Lat 42°58'22", long 83°46'08", in SW¼ sec.28, T.7 N., R.6 E., Genesee County, at bridge on Bristol Road, 3.2 miles east of Swartz Creek.	40.6	1970-83	05-02-83	7.00	500
04148410	Thread Creek near Goodrich, MI	Lat 42°53'19", long 83°32'10", in SE¼ sec.29, T.6 N., R.8 E., Genesee County, at bridge on Baldwin Road, 2.4 miles southwest of Goodrich.	28.8	1970-83	05-02-83	<3.2	<99

See footnotes at end of table.

Annual maximum discharge at crest-stage partial-record stations during water year 1983--Continued

Station No.	Station name	Location	Drainage area (mi²)	Period of record	Annual maximum		
					Date	Gage height (feet)	Discharge (ft³/s)
		Streams tributary to Lake Huron--Continued					
04148610	Cole Creek near Flushing, MI	Lat 43°02'44", long 83°51'06", in SW¼ sec.35, T.8 N., R.5 E., Genesee County, at bridge on Potter Road, 1.2 miles south of Flushing.	8.51	1970-83	05-02-83	6.17	167
04148620	Freeman Drain near Montrose, MI	Lat 43°07'04", long 83°53'37", in SE¼ sec.5, T.7 N., R.5 E., Genesee County, at bridge on Mt. Morris Road, 4.0 miles south of Montrose.	8.21	1970-83	05-02-83	6.18	276
04148640	Armstrong Creek near Montrose, MI	Lat 43°08'04", long 83°50'03", in SE¼ sec.35, T.9 N., R.5 E., Genesee County, at bridge on Morrish Road, 4.1 miles southeast of Montrose.	11.9	1970-83	05-02-83	6.41	200
04148740	Central-Stadler Drain near Montrose, MI	Lat 43°09'46", long 83°50'14", in SE¼ sec.23, T.9 N., R.5 E., Genesee County, at bridge on Wilson Road, 3.1 miles east of Montrose.	15.0	1970-83	05-02-83	4.89	201
04148800	Pine Run near Montrose, MI	Lat 43°12'42", long 83°48'54", in SE¼ sec.1, T.9 N., R.5 E., Genesee County, at bridge on Elms Road, 4.7 miles northeast of Montrose.	28.2	1970-83	05-02-83	8.57	418
04148900	Silver Creek near Clio, MI	Lat 43°12'54", long 83°45'55", in NW¼ sec.4, T.9 N., R.6 E., Genesee County, at bridge on Weir Road, 3.0 miles northwest of Clio.	3.70	1970-83	05-02-83	3.15	58
04149300	Misteguay Creek near Flushing, MI	Lat 43°01'31", long 83°54'41", in NE¼ sec.7, T.7 N., R.5 E., Genesee County, at bridge on Duffield Road, 3.7 miles southwest of Flushing.	17.3	1970-83	05-02-83	9.30	760
		Streams tributary to St. Clair River					
04160350	Pine River near Rattle Run, MI	Lat 42°52'49", long 82°34'04", in NE¼ sec.9, T.5 N., R.16 E., St. Clair County, on right downstream wingwall of bridge on Gratiot Road, 1.9 miles northeast of Rattle Run.	135	1974-83	05-02-83	17.19	1,700
		Streams tributary to Lake St. Clair					
04161000	Clinton River at Auburn Heights, MI	Lat 42°38'00", long 83°13'28", in NW¼ sec. 36, T.3 N., R.10 E., Oakland County, at bridge on Auburn Road, at Auburn Heights.	123	1935-40, 1956-82‡, 1983	05-02-83	4.32	1,070
04161500	Paint Creek near Lake Orion, MI	Lat 42°46'03", long 83°13'12", in NE¼ sec.13, T.4 N., R.10 E., Oakland County, on left bank 100 feet upstream from railroad bridge, 1.6 miles southeast of Lake Orion, and 2.8 miles upstream from Trout Creek.	38.5	1959-75‡, 1976-83	04-14-83	3.14	146
04161760	West Branch Stony Creek near Washington, MI	Lat 42°43'53", long 83°06'02", in SE¼ sec.25, T.4 N., R.11 E., Oakland County, at bridge on Huron-Clinton Metropolitan Park Road, and 3.4 miles west of Washington.	22.5	1965-83	05-02-83	3.28	138
04164010	North Branch Clinton River at Almont, MI	Lat 42°54'59", long 83°02'42", in NE¼ sec.28, T.6 N., R.12 E., Lapeer County, at bridge on State Highway 53, at Almont.	9.56	1959-62, 1963-68‡, 1969-83	05-02-83	<3.72	<167
04164050	North Branch Clinton River near Romeo, MI	Lat 42°49'11", long 82°58'35", in NW¼ sec.31, T.5 N., R.13 E., Macomb County, at bridge on 33 Mile Road, 2.2 miles northeast of Romeo.	49.7	1959-64, 1965-69‡, 1970-83	05-02-83	3.79	771
04164150	North Branch Clinton River near Meade, MI	Lat 42°43'50", long 82°54'23", in NE¼ sec.34, T.4 N., R.13 E., Macomb County, on left bank at bridge on 27 Mile Road, 1.9 miles northwest of Meade.	89.6	1959-67, 1968-72‡, 1973-83	05-02-83	6.59	1,260
04164200	Coon Creek near Armada, MI	Lat 42°47'41", long 82°52'58", in SW¼ sec.1, T.4 N., R.13 E., Macomb County, at bridge on North Road, 3.4 miles south of Armada.	10.0	1971-83	05-02-83	5.55	220
04164350	Highbank Creek near Armada, MI	Lat 42°28'24", long 82°51'08", in NW¼ sec.6, T.4 N., R.14 E., Macomb County, at bridge on 32 Mile Road, 3.0 miles southeast of Armada.	14.9	1959-65, 1966-70‡, 1971-83	05-02-83	g15.36	f390
04164360	East Branch Coon Creek near New Haven, MI	Lat 42°45'46", long 82°50'57", in NW¼ sec.19, T.4 N., R.14 E., Macomb County, at bridge on 29 Mile Road, 3.4 miles northwest of New Haven.	36.1	1959-67, 1968-72‡, 1973-83	05-02-83	7.95	849

See footnotes at end of table.

Annual maximum discharge at crest-stage partial-record stations during water year 1983--Continued

					Annual maximum		
Station No.	Station name	Location	Drainage area (mi^2)	Period of record	Date	Gage height (feet)	Discharge (ft^3/s)
		Streams tributary to Lake St. Clair--Continued					
04164400	Deer Creek near Meade, MI	Lat 42°42'39", long 82°51'32", in NW¼ sec.6, T.3 N., R.14 E., Macomb County, at bridge on 25½ Mile Road, 0.9 mile southeast of Meade.	12.7	1959-60, 1961-65‡, 1966-83	05-02-83	7.20	434
04164450	McBride Drain near Macomb, MI	Lat 42°41'14", long 82°55'14", in NE¼ NE¼ sec.16, T.3 N., R.13 E., Macomb County, at bridge on 24 Mile Road, 2.2 miles southeast of Macomb.	5.79	1960-64‡, 1965-83	05-02-83	7.42	107
04164600	Middle Branch Clinton River near Macomb, MI	Lat 42°42'03", long 82°59'44", in SE¼ sec.2, T.3 N., R.12 E., Macomb County, at bridge on Schoenherr Road, 2.0 miles west of Macomb.	22.2	1959-64, 1965-69‡, 1971-83	05-02-83	11.70	879
04164800	Middle Branch Clinton River at Macomb, MI	Lat 42°42'23", long 82°57'33", in SW¼ sec.5, T.3 N., R.13 E., Macomb County, at bridge on Romeo Plank Road, 0.4 mi north of Macomb.	41.0	1959-62, 1963-68‡, 1969, 1970-82‡, 1983	05-02-83	13.67	1,130
04165200	Gloede Ditch near Waldenburg, MI	Lat 42°37'39", long 82°57'10", in SW¼ sec.32, T.3 N., R.13 E., Macomb County, 2.2 miles south of Waldenburg.	16.0	1959, 1960-64‡, 1965-83	05-02-83	16.17	349
		Streams tributary to Detroit River					
04167000	Middle River Rouge near Garden City, MI	Lat 42°20'55", long 83°18'45", in SW¼ NW¼ sec.6, T.2 S., R.10 E., Wayne County, on right bank 200 feet downstream from bridge on Inkster Road, 1.8 miles northeast of Garden City.	99.9	1931-33‡, 1948-77‡, 1978-83	05-02-83	9.86	1,930
04168660	Frank and Poet Drain at Trenton, MI	Lat 42°09'19", long 83°12'22", in NW¼ sec.13, T.4 S., R.10 E., Wayne County, at bridge on King Road, at Trenton.	19.3	1972-83	05-02-83	8.68	400
		Streams tributary to Lake Erie					
04168800	Huron River near Andersonville, MI	Lat 42°41'35", long 83°29'56", in NW¼ SE¼ sec.3, T.3 N., R.8 E., Oakland County, on downstream side of culvert on White Lake Road, 2.5 miles south of Andersonville.	14.0	1974-83	05-02-83	<1.95	<58
04173250	Mill Creek near Lima Center, MI	Lat 42°15'56", long 83°56'45", in NE¼ sec.34, T.2 S., R.4 E., Washtenaw County, at Guenther Road, 2.0 miles upstream from North Fork Mill Creek, and 2.2 miles south of Lima Center.	47.3	1973-83	05-02-83	10.24	669
04175960	South Branch River Raisin near Adrian, MI	Lat 41°55'03", long 84°00'37", in SE¼ sec.25, T.6 S., R.3 E., Lenawee County, at Howell Highway, 2.0 miles northeast of Adrian.	165	1979-83	05-03-83	11.41	1,720
04176000	River Raisin near Adrian, MI	Lat 41°54'15", long 83°58'50", in NW¼ sec.5, T.7 S., R.4 E., Lenawee County, at Academy Road, 1.7 miles east of Adrian.	463	1954-78‡, 1979-83	05-03-83	14.72	5,160
04176400	Saline River near Saline, MI	Lat 42°07'50", long 83°46'35", in SW¼ sec.18, T.4 S., R.5 E., Washtenaw County, at bridge on Maple Road, 2.8 miles south of Saline.	94.6	1966-77‡, 1978-83	05-02-83	11.75	1,900

‡ Operated as a continuous-record gaging station.
* Also a low-flow partial-record station.
a Approximately.
b Backwater from Lake Superior or sand bar at mouth.
c Maximum gage height, 11.50 ft, Mar. 8, 1983, backwater from ice.
d Maximum gage height, 5.03 ft, Mar. 9, 1983, backwater from ice.
e Revised.
f Computed on basis of correlation with nearby stations.
g Backwater from log jam.

Measurements of streamflow at points other than gaging stations or partial-record stations are given in the following table. Those that are measurements of base flow are designated by an asterisk (*).

DISCHARGE MEASUREMENTS MADE AT MISCELLANEOUS SITES DURING WATER YEAR 1983

Stream	Tributary to	Location	Drainage area (mi²)	Measured previously (water years)	Measurements	
					Date	Discharge (ft³/s)
		Streams tributary to Lake Michigan				
Iron River	Brule River	Lat 46°03'31", long 88°37'38", in SE¼ SW¼ sec.1, T.42 N., R.35 W., Iron County, at County Highway 424, in Caspian, 5.0 mi upstream from mouth.	92.1	1948-80‡	07-19-83 08-09-83 09-14-83 09-21-83	*83.6 *76.2 *72.4 261
Skunk Creek	East Branch Sturgeon River	Lat 46°01'51", long 87°49'46", in SE¼ SE¼ sec.17, T.42 N., R.28 W., Dickinson County, 0.3 mile upstream from mouth, 2.2 miles north of Felch, MI.	14.5	1973-76, 1978-82	12-29-82 03-10-83 05-25-83	21.7 41.7 58.6
Swan Creek	St. Joseph River	Lat 41°53'30", long 85°21'02", in NE¼ sec.4, T.7 S., R.9 W., St. Joseph County, at Needham Road, 4.0 miles northwest of Burr Oak, MI.		1982	07-19-83	*b22.3
North Branch Rice Creek	Rice Creek	Lat 42°21'05", long 84°43'02", in SE¼ sec.25, T.1 S., R.4 W., Calhoun County, at 30 Mile Road, 5.0 miles northeast of Albion, MI.			09-27-83	*b6.02
South Branch Rice Creek	do	Lat 42°47'23", long 84°45'21", in NE¼ sec.22, T.2 S., R.4 W., Calhoun County, at 28 Mile Road, 3.0 miles north of Albion, MI.			09-27-83	*b8.47
do	do	Lat 42°17'51", long 84°49'48", in NE¼ sec.18, T.2 S., R.5 W., Calhoun County, at 24 Mile Road, 5.0 miles northwest of Albion, MI.			09-27-83	*b14.1
Rice Creek	Kalamazoo River	Lat 42°17'42", long 84°51'52", in SW¼ sec. 14, T.2 S., R.5 W., Calhoun County, at 22½ Mile Road, 4.0 miles northeast of Marshall, MI.			09-27-83	*b28.2
do	do	Lat 42°17'32", long 84°54'25", in SE¼ sec. 17, T.2 S., R.5 W., Calhoun County, at 20 Mile Road, 2.2 miles northeast of Marshall, MI.			09-27-83	b38.3
do	do	Lat 42°16'30", long 84°55'50", in SW¼ sec. 19, T.2 S., R.5 W., Calhoun County, at Michigan Avenue, 0.5 mile east of Marshall, MI.			09-27-83	b46.2
Dickinson Creek	Battle Creek	Lat 42°17'30", long 85°04'07" in SW¼ sec.12, T.2 S., R.7 W., Calhoun County, at H Drive, 2.5 miles north of Ceresco, MI.			04-26-83 06-09-83 07-08-83 08-09-83	*1.91 *2.69 *.48 *.53
do	do	Lat 42°17'33", long 85°06'38", in SE¼ sec. 15, T.2 S., R.7 W., Calhoun County, at F Drive N., 3.0 miles northwest of Ceresco, MI.			04-26-83 06-09-83 07-08-83 08-09-83	*4.08 *6.48 *3.03 *2.17
Unnamed tributary	Kalamazoo River	Lat 42°17'58", long 85°07'43", in NE¼ sec.16, T.2 S., R.7 W., Calhoun County, 0.1 mile above mouth, 1.0 mile southeast of Battle Creek, MI.			04-26-83 06-09-83 07-08-83 08-09-83	*1.38 *1.22 *1.01 *.96
Unnamed tributary	do	Lat 42°18'38", long 85°08'12", in SW¼ sec.9, T.2 S., R.7 W., Calhoun County, at Michigan Avenue, in Battle Creek, MI.			04-26-83 06-09-83 07-08-83 08-09-83	*1.52 *2.47 *1.57 *1.31
Unnamed tributary	Battle Creek	Lat 42°22'55", long 85°03'36", in SW¼ sec.18, T.1 S., R.6 W., Calhoun County, at junction of Bellevue and 12 Mile Roads, 2.3 miles east of Pennfield, MI.			04-26-83 06-09-83 07-08-83 08-09-83	*1.83 *2.04 *.78 *.67
Wonadoga Creek	do	Lat 42°22'12", long 85°07'44", in NE¼ sec.21, T.1 S., R.7 W., Calhoun County, at Q Drive N., 2.0 miles northeast of Battle Creek, MI.			04-26-83 06-09-83 07-08-83 08-09-83	*53.6 *47.9 *18.4 *16.1
Unnamed tributary	Kalamazoo River	Lat 42°20'50", long 85°12'08", in NE¼ sec.35, T.1 S., R.8 W., Calhoun County, at Wabascan Road in Battle Creek, MI.			04-26-83 06-09-83 07-08-83 08-09-83	*.47 *.56 *.17 *.24
Kalamazoo River	Lake Michigan	Lat 42°17'05", long 85°30'50", in NE¼ sec.19, T.2 S., R.10 W., Kalamazoo County, at River Street in Comstock, MI.	a1,010	‡1931, 1933-1980	10-12-82	*b568

See footnotes at end of table.

DISCHARGE MEASUREMENTS MADE AT MISCELLANEOUS SITES DURING WATER YEAR 1983--CONTINUED

Stream	Tributary to	Location	Drainage area (mi^2)	Measured previously (water years)	Measurements	
					Date	Discharge (ft^3/s)
		Streams tributary to Lake Michigan--continued				
Portage Creek	Kalamazoo River	Lat 42°17'03", long 85°34'45", in sec.22, T.2 S., R.11 W., Kalamazoo County, at Vine Street in Kalamazoo, MI.			10-12-82	*b42.2
Gun River	do	Lat 42°28'07", long 85°39'25", in SW¼ sec.18, T.1 N., R.11 W., Allegan County, at 11th Street, 1.0 mile northeast of Otsego, MI.			10-12-82	*b60.6
Kalamazoo River	Lake Michigan	Lat 42°27'45", long 85°42'07", in sec.22, T.1 N., R.12 W., Allegan County, at North Street in Otsego, MI.			10-12-82	*b840
Pine Creek	Kalamazoo River	Lat 42°27'22", long 85°44'07", in sec.21, T.1 N., R.12 W., Allegan County, at Jefferson Road, 1.0 mile west of Otsego, MI.		1976	10-12-82	*b53.0
Red Cedar River	Grand River	Lat 42°41'12", long 84°08'12", in NE¼ sec.15, T.3 N., R.3 E., Livingston County, at Garden Lane Road at Fowlerville, MI.			10-05-82	*b8.39
do	do	Lat 42°40'37", long 84°05'37", in SW¼ sec.3, T.3 N., R.3 E., Livingston County, at Gregory Road, 1.6 miles northwest of Fowlerville, MI.			10-05-82	*b12.1
do	do	Lat 42°41'12", long 84°08'12", in SW¼ sec.32, T.4 N., R.3 E., Livingston County, at Stow Road, 3.6 miles northwest of Fowlerville, MI.			10-05-82	*b11.9
do	do	Lat 42°41'17", long 84°17'22", in SE¼ sec.35, T.4 N., R.1 E., Ingham County, above confluence with Deer Creek at Grand River Road at Williamston, MI.			08-10-83	b33.0
Fish Creek	Maple River	Lat 43°14'59", long 84°58'52", in SE¼ sec.14, T.10 N., R.6 W., Montcalm County, at Sidney Road, 3.3 miles southwest of Crystal, MI.			09-26-83	b31.4
West Branch Fish Creek	Fish Creek	Lat 43°14'33", long 85°45'04", in NW¼ sec.22, T.10 N., R.6 W., Montcalm County, at Townhall Road, 5.1 miles west of Crystal, MI.			09-26-83	b22.3
do	do	Lat 43°14'45", long 84°57'17", in NW¼ sec.19, T.10 N., R.5 W., Montcalm County, at Senator Road, 2.5 miles southwest of Crystal, MI.			09-26-83	b60.1
do	do	Lat 42°14'30", long 84°54'56", in SW¼ sec.21, T.10 N., R.5 W., Montcalm County, at Crystal Road, 1.0 mile south of Crystal, MI.	92.8	1963-65	09-26-83	b58.5
do	do	Lat 43°13'03", long 84°53'09", in NE¼ sec.34, T.10 N., R.5 W., Montcalm County, at Bollinger Road, 2.7 miles northwest of Carson City, MI.		1972	09-26-83	b61.8
do	do	Lat 43°12'23", long 84°52'33", NE¼ sec.2, T.9 N., R.5 W., Montcalm County, at Condensery Road, 2.0 miles north of Carson City, MI.			09-26-83	b66.1
Prairie Creek	Grand River	Lat 43°01'53", long 85°00'41", in NW¼ sec.3, T.7 N., R.6 W., Ionia County, at Nickle Plate Road, 3.5 miles northeast of Ionia, MI.			07-15-83	*b19.2
do	do	Lat 43°01'17", long 85°01'25", in SE¼ sec.4, T.7 N., R.6 W., Ionia County, below Sterner Hydro Dam, 3.0 miles northeast of Ionia, MI.			07-15-83	*b26.1
do	do	Lat 43°00'43", long 85°01'02", in NE¼ sec.9, T.7 N., R.6 W., Ionia County, at Welch Road, 2.8 miles northwest of Ionia, MI.			07-15-83	*b30.9
do	do	Lat 43°59'30", long 85°01'43", in SW¼ sec.16, T.7 N., R.6 W., Ionia County, at M-21, 1.5 miles east of Ionia, MI.	89.6	1955, 1960-61, 1963-65, 1975	07-15-83	*b27.6
Buck Creek	do	Lat 42°48'42", long 85°41'44", in NW¼ sec.23, T.5 N., R.12 W., Kent County, at 84th Street, 1.5 miles east of Byron Center, MI.			08-23-83	b2.15
do	do	Lat 42°50'27", long 85°40'21", in SE¼ sec.1, T.5 N., R.12 W., Kent County, at 68th Street, 0.5 mile east of Cutlerville, MI.			08-23-83	b8.72

See footnotes at end of table.

DISCHARGE MEASUREMENTS MADE AT MISCELLANEOUS SITES DURING WATER YEAR 1983--CONTINUED

Stream	Tributary to	Location	Drainage area (mi²)	Measured previously (water years)	Measurements	
					Date	Discharge (ft³/s)
		Streams tributary to Lake Michigan				
Buck Creek	Grand River	Lat 42°46'18", long 85°40'57", in SE¼ sec.26, T.6 N., R.12 W., Kent County, at Clyde Park Avenue, at Wyoming, MI.	40.0	1952-53	08-23-83	b20.3
do	do	Lat 42°53'27", long 85°43'27", in SW¼ sec.22, T.6 N., R.12 W., Kent County, at Byron Center Road, at Wyoming, MI.	44.2	1952-53	08-23-83	b23.7
do	do	Lat 42°54'13", long 85°46'21", in SE¼ sec.18, T.6 N., R.12 W., Kent County, at South Canal Avenue, at Grandville, MI.		1962	08-23-83	b27.1
Clam River	Muskegon River	Lat 44°15'15", long 85°24'35", in SE¼ SW¼ sec.33, T.22 N., R.9 W., Wexford County, downstream from dam in Cadillac, MI.		1970	06-28-83 07-12-83 08-16-83 08-31-83 09-14-83	b3.73 *b5.41 *b5.50 b4.20 *b4.36
do	do	Lat 44°15'25", long 85°24'10", in NW¼ SE¼ sec.33, T.22 N., R.9 W., Wexford County, at Smith Road, in Cadillac, MI.		-	06-28-83 07-12-83 08-16-83 08-31-83	b4.13 *b3.41 *b4.39 b4.50
do	do	Lat 44°16'00", long 85°23'40", in SE¼ SE¼ sec.28, T.22 N., R.9 W., Wexford County at Plett Road, in Cadillac, MI.		1975	06-28-83 07-12-83 08-16-83 08-31-83	b6.28 *b7.40 *b6.24 b7.40
do	do	Lat 44°16'55", long 85°22'30", in SW¼ SE¼ sec.22, T.22 N., R.9 W., Wexford County at Boon Road, 1.0 mile north of Cadillac, MI.		1975	06-28-83 06-29-83 07-12-83 08-16-83 08-31-83 09-14-83	b5.65 b4.32 *b5.47 *b5.84 b5.50 *b5.71
do	do	Lat 44°17'08", long 85°21'25", in NE¼ SE¼ sec.23, T.22 N., R.9 W., Wexford County, at trailer park on Boon Road, 2.5 miles northeast of Cadillac, MI.			06-28-83 06-29-83 07-12-83 08-16-83 08-31-83 09-14-83	b5.41 b3.72 *b3.64 *b4.12 b4.20 *b4.41
do	do	Lat 44°17'09", long 85°20'10", in SE¼ SE¼ sec.24, T.22 N., R.9 W., Wexford County, at County Line Road, 3.0 miles east of Cadillac, MI.		1975	06-28-83 07-12-83 08-16-83 08-31-83 09-14-83	b6.73 *b4.02 *b3.90 b3.50 *b3.25
do	do	Lat 44°17'06", long 85°17'20", in SE¼ SE¼ sec.20, T.22 N., R.8 W., Missaukee County, at LaChance Road, 3.0 miles south of Jennings, MI.		1945-51, 1975	06-28-83 06-29-83 07-12-83 08-16-83 08-31-83 09-14-83	b20.4 b16.4 *b13.7 *b13.2 b12.3 *b12.6
do	do	Lat 44°15'45", long 85°15'15", in SE¼ NE¼ sec.34, T.22 N., R.8 W., Missaukee County, at M-55 3.3 miles south of Jennings, MI.		1946	06-28-83 06-29-83 07-12-83	b33.6 b26.4 *b20.4
Silver Creek	White River	Lat 43°24'53", long 86°16'12", in NE¼ SE¼ sec.24, T.12 N., R.16 W., Muskegon County, at Hyde Park Road, 4.2 miles northeast of Whitehall, MI.			08-17-83	b13.5
Cedar Run	Lake Leelanau	Lat 44°46'35", long 85°48'28", in SE¼ SW¼ sec.31, T.28 N., R.12 W., Leelanau County, at Cedar Valley Drive, 5.0 miles south of Cedar, MI.			08-04-83	*b10.0
Mitchell Creek	Lake Michigan	Lat 44°44'05", long 85°33'18", in NW¼ SW¼ sec.17, T.27 N., R.10 W., Grand Traverse County, at Three Mile Road, in Traverse City, MI.			12-22-82 02-01-83 03-02-83 07-20-83	*7.07 *7.44 *9.03 *2.83
do	do	Lat 44°44'52", long 85°33'25", in SE¼ SE¼ sec.7, T.27 N., R.10 W., Grand Traverse County, at first bridge upstream from Three Mile Road, in Traverse City, MI.			12-22-82 02-01-83 03-02-83 07-20-83	*8.53 *9.55 *10.5 *4.92
Rapid River	Torch River	Lat 44°47'32", long 85°12'03", in NW¼ SE¼ sec.30, T.28 N., R.7 W., Kalkaska County, at Wood Road, 3.0 miles northwest of Kalkaska, MI.			07-20-83	*b67.3

See footnotes at end of table.

DISCHARGE MEASUREMENTS MADE AT MISCELLANEOUS SITES DURING WATER YEAR 1983--CONTINUED

Stream	Tributary to	Location	Drainage area (mi²)	Measured previously (water years)	Measurements Date	Measurements Discharge (ft³/s)
		Streams tributary to Lake Michigan--continued				
Jordan River	Lake Charlevoix	Lat 45°02'10", long 84°58'06", in NW¼ SW¼ sec.31, T.31 N., R.5 W., Antrim County, at Jordan River Road, 4.0 miles north of Alba, MI.		1977, 1978	08-05-83	*b44.0
do	do	Lat 45°00'51", long 85°01'44", in NE¼ NE¼ sec.9, T.30 N., R.6 W., Antrim County, at Pinney Bridge, 4.0 miles northwest of Alba, MI.	29.6	1968, 1971, 1977-78	08-05-83	*b123
		Streams tributary to Lake Huron				
Upper Tomahawk Lake Outlet	West Branch Upper Rainy River	Lat 45°11'00", long 84°04'30", in NE¼ NW¼ sec.9, T.32 N., R.3 E., Montmorency County, at bridge on Forest Road, 0.2 mile above Rainy River Flooding, 10.3 miles south of Millersburg, MI.		1982	11-02-82	*b0.56
West Branch Upper Rainy River	Rainy Lake	Lat 45°14'25", long 84°04'09", in NE¼ NE¼ sec. 21, T.33 N., R.3 E., Presque Isle County, at South Shore Drive, 6.4 miles south of Millersburg, MI.		1982	10-26-82 01-04-83 02-01-83	*6.08 *11.3 *5.01
Healy Creek	West Branch Upper Rainy River	Lat 45°19'25", long 84°04'00", in NE¼ NE¼ sec.21, T.33 N., R.3 E., Presque Isle County, at South Shore Drive, 6.4 miles south of Millersburg, MI.		1982	10-26-82 11-02-82 01-04-83 02-01-83	*2.76 *b2.96 *4.23 *3.02
West Branch Upper Rainy River	Rainy Lake	Lat 45°14'41", long 84°03'56", in NE¼ SE¼ sec.16, T.33 N., R.3 E., Presque Isle County, 300 ft upstream from Rainy Lake, 6.0 miles south of Millersburg, MI.		1982	11-02-82	*b5.70
Chippewa River	Tittabawassee River	Lat 43°39'07", long 84°59'16", in NE¼ sec.35, T.15 N., R.6 W., Isabella County at Coldwater Road, 2.5 miles south of Weidman, MI.			10-19-82 11-02-82	*b77.0 b232
Portage River	Huron River	Lat 42°25'40", long 83°57'35", in SW¼ sec.34, T.1 N., R.4 E., Livingston County, at Tiplady Road, 2.2 miles southwest of Pinckney, MI.	a79	‡1944-71, †1972-79	08-08-83	*b14.8
South Branch River Raisin	River Raisin	Lat 41°54'22", long 84°02'08", SE¼ sec.35, T.6 S., R.3 E., Lenawee County, 100 ft above railroad bridge, at Adrian, MI.			07-26-83	*b16.4
Wolf Creek	South Branch River Raisin	Lat 41°54'37", long 84°02'10", in NW¼ sec. 35, T.6 S., R.3 E., Lenawee County, at water treatment plant, at Adrian, MI.			07-26-83	*b8.02
Beaver Creek	do	Lat 41°55'38", long 84°00'42", in NE¼ sec.25, T.6 S., R.3 E., Lenawee County, at M-52, 1.1 miles northwest of Adrian, MI.	14.7	1970	07-26-83	*b3.39
River Raisin	Lake Erie	Lat 41°56'35", long 83°56'45", in NE¼ sec.21, T.6 S., R.4 E., Lenawee County, at North Raisin Center Highway, 4.5 miles south of Tecumseh, MI.	267	‡1957-80	07-26-83	*b118

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* Base flow.
‡ Operation as a continuous-record gaging station.
a Approximately.
b Discharge measurement made by employees of Michigan Department of Natural Resources.

STREAMS TRIBUTARY TO LAKE MICHIGAN

WATER-QUALITY DATA, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

415003084581601 McELHNEY DRAIN AT COLDWATER LAKE NEAR COLDWATER, MI (LAT 41°50'03", LONG 084°58'16")

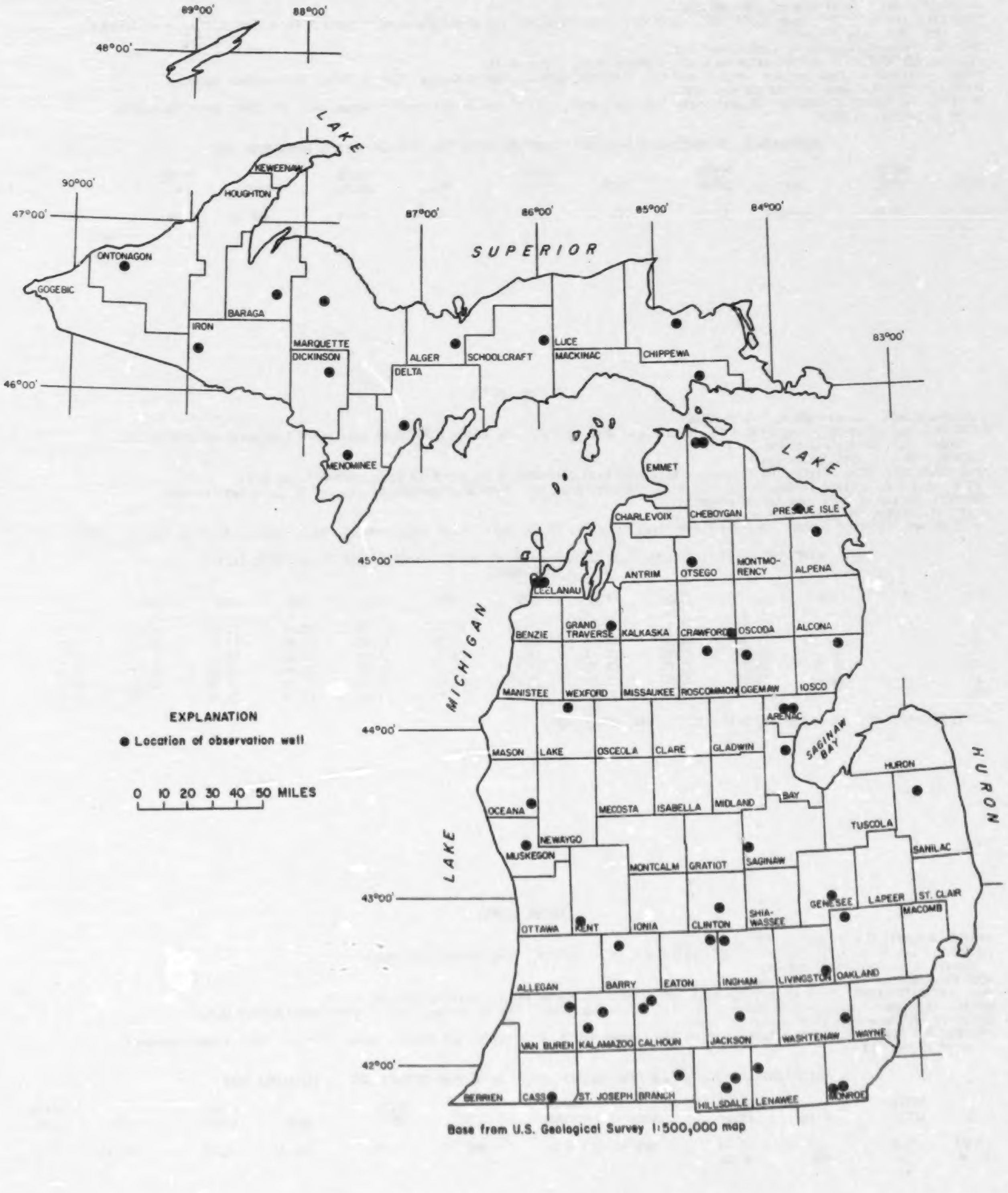
DATE	TIME	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (STAND-ARD UNITS)	TEMPER-ATURE (DEG C)	NITRO-GEN, NITRATE TOTAL (MG/L AS N)	NITRO-GEN, NITRITE TOTAL (MG/L AS N)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N)	NITRO-GEN, ORGANIC TOTAL (MG/L AS N)	NITRO-GEN,AM-MONIA + ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS NO3)
JUN												
29...	1500	473	7.5	19.0	.09	.010	.10	.280	1.1	1.40	1.5	6.6

DATE	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS, ORTHO, TOTAL (MG/L AS P)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD)	CHRO-MIUM, TOTAL RECOV-ERABLE (UG/L AS CR)	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN)	PHYTO-PLANK-TON, TOTAL (CELLS PER ML)
JUN											
29...	.090	.060	<1	10	<10	1200	12	210	<100	10	2700

415007084581401 QUIMBY DRAIN AT COLDWATER LAKE NEAR COLDWATER, MI (LAT 41°50'07", LONG 084°58'14")

DATE	TIME	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (STAND-ARD UNITS)	TEMPER-ATURE (DEG C)	NITRO-GEN, NITRATE TOTAL (MG/L AS N)	NITRO-GEN, NITRITE TOTAL (MG/L AS N)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N)	NITRO-GEN, ORGANIC TOTAL (MG/L AS N)	NITRO-GEN,AM-MONIA + ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS NO3)
JUN												
29...	1330	818	7.7	19.5	.74	.060	.80	6.50	2.3	8.80	9.6	42

DATE	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS, ORTHO, TOTAL (MG/L AS P)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD)	CHRO-MIUM, TOTAL RECOV-ERABLE (UG/L AS CR)	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN)	PHYTO-PLANK-TON, TOTAL (CELLS PER ML)
JUN											
29...	2.10	2.10	<1	10	10	290	14	210	<100	1100	6400


89°00'
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HURON
SAGINAW BAY
KEWEENAW
HOUGHTON
ONTONAGON
GOGEBIC
BARAGA
IRON
MARQUETTE
DICKINSON
ALGER
DELTA
SCHOOLCRAFT
LUCE
MACKINAC
CHIPPEWA
MENOMINEE
EMMET
CHARLEVOIX
CHEBOYGAN
PRESQUE ISLE
ANTRIM
OTSEGO
MONTMORENCY
ALPENA
LEELANAU
BENZIE
GRAND TRAVERSE
KALKASKA
CRAWFORD
OSCODA
ALCONA
MANISTEE
WEXFORD
MISSAUKEE
ROSCOMMON
OGEMAW
IOSCO
ARENAC
MASON
LAKE
OSCEOLA
CLARE
GLADWIN
HURON
OCEANA
MECOSTA
ISABELLA
MIDLAND
BAY
TUSCOLA
NEWAYGO
MUSKEGON
MONTCALM
GRATIOT
SAGINAW
SANILAC
GENESEE
LAPEER
ST. CLAIR
OTTAWA
KENT
IONIA
CLINTON
SHIAWASSEE
MACOMB
ALLEGAN
BARRY
EATON
INGHAM
LIVINGSTON
OAKLAND
VAN BUREN
KALAMAZOO
CALHOUN
JACKSON
WASHTENAW
WAYNE
BERRIEN
CASS
ST. JOSEPH
BRANCH
HILLSDALE
LENAWEE
MONROE
EXPLANATION
● Location of observation well
0 10 20 30 40 50 MILES

Base from U.S. Geological Survey 1:500,000 map

FIGURE 9.--Map showing location of observation wells published in this report.

ALGER COUNTY

461608086373801. Local number, 45N 19W 25BDDB.
LOCATION.--Lat 46°16'08", long 086°37'38", Hydrologic Unit 04060106, 250 ft northwest of highway M-44, 0.2 mi northeast of Kentucky.
Owner: U.S. Forest Service.
AQUIFER.--Glacial deposits of Pleistocene age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in, depth 66 ft.
DATUM.--Altitude of land-surface datum is 850 ft. Measuring point: Top of casing, 3.60 ft above land-surface datum.
PERIOD OF RECORD.--June 1959 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 6.35 ft below land-surface datum, June 29, 1960; lowest measured, 14.19 ft Apr. 3, 1964.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 6	10.83	JAN 14	10.40	MAY 2	9.88	JUN 23	9.94	SEP 14	10.94

ALPENA COUNTY

450850083393401. Local number, 32N 6E 23DDDA.
LOCATION.--Lat 45°08'50", long 083°39'34", Hydrologic Unit 04070006, on Graham Road, 3 mi east and 1.5 mi north of Long Rapids.
Owner: U.S. Geological Survey.
AQUIFER: Sand of Pleistocene age.
WELL CHARACTERISTICS.--Drilled water table observation well, diameter 6 in, depth 88 ft, screened 79 to 88 ft.
DATUM.--Altitude of land-surface datum is 713 ft. Measuring point: Plywood instrument shelf, 2.7 ft above land-surface.
REMARKS.--Bottom of hole near top of bedrock.
PERIOD OF RECORD.--November 1976 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 13.61 ft below land-surface datum, May 22, 1983; lowest, 30.01 ft Mar. 27, 1982.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	--	--	25.31	22.47	21.74	20.58	17.72	17.37	14.62	17.82	19.52	21.58
10	--	--	24.56	22.23	21.54	18.67	16.10	15.03	15.45	17.95	19.81	22.09
15	--	--	24.17	22.11	21.41	17.63	15.45	14.30	16.02	18.30	20.00	22.56
20	--	25.79	23.85	22.05	21.37	17.85	15.90	14.00	16.69	18.61	20.44	22.58
25	--	25.77	23.55	21.87	21.09	18.05	16.65	13.88	17.08	19.09	20.74	22.57
EOM	--	25.61	22.84	21.76	20.87	18.16	17.29	13.86	17.34	19.36	21.25	22.75

WTR YEAR 1983 MAX 13.61 MAY 22, 1983 MIN 27.80 OCT 1, 1982

ARENAC COUNTY

440342083542801. Local number, 19N 5E 7DABA1.
LOCATION.--Lat 44°03'42", long 083°54'28", Hydrologic Unit 04080101, 3 mi northeast of Omer.
Owner: U.S. Geological Survey.
AQUIFER.--Saginaw Formation of Pennsylvanian age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in, depth 185 ft, screened 180 to 185 ft.
DATUM.--Altitude of land-surface datum is 667 ft. Measuring point: Top of casing, 2.00 ft above land-surface datum.
PERIOD OF RECORD.--June 1980 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 8.28 ft below land-surface datum, July 15, 1980; lowest measured, 10.09 ft Nov. 12, 1981.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 18	9.68	JAN 6	9.98	MAR 31	9.15	MAY 4	9.00	JUL 11	9.23	AUG 15	9.40
NOV 30	9.37	FEB 16	9.14								

ARENAC COUNTY

440342083542802. Local number, 19N 5E 7DABA2.
LOCATION.--Lat 44°03'42", long 083°54'28", Hydrologic Unit 04080101, 3 mi northeast of Omer.
Owner: U.S. Geological Survey.
AQUIFER.--Lake bed sand of Pleistocene age.
WELL CHARACTERISTICS.--Drilled water table well, diameter 6 in, depth 21 ft, screened 16 to 21 ft.
DATUM.--Altitude of land-surface datum is 667 ft. Measuring point: Top of casing, 2.20 ft above land-surface datum.
PERIOD OF RECORD.--June 1980 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 2.90 ft below land-surface datum, June 23, 1982; lowest measured, 6.95 ft Aug. 21, 1980.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 18	5.35	JAN 6	3.84	MAR 31	3.20	MAY 4	2.34	JUL 11	3.69	AUG 15	4.51
NOV 30	4.95	FEB 16	4.28								

BARAGA COUNTY

463353088144301. Local number, 48N 32W 12DDCC.
LOCATION.--Lat 46°33'53", long 088°14'43", Hydrologic Unit 04030107, 95 ft north of U.S. Highway 41 and 0.5 mi southeast of Nestoria Road.
Owner: Michigan State Highway Department.
AQUIFER.--Sand and gravel of Pleistocene age.
WELL CHARACTERISTICS.--Drilled water-table well, diameter 1¼ in, depth 10 ft, screened 7 to 10 ft.
DATUM.--Altitude of land-surface datum is 1,630 ft. Measuring point: Top of casing, 4.78 ft above land-surface datum.
REMARKS.--Measurements made by Wisconsin-Michigan Power Company.
PERIOD OF RECORD.--September 1948 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 3.27 ft below land-surface datum, Apr. 30, 1965; lowest measured, 8.09 ft Sept. 2, 1960.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 31	5.70	DEC 31	5.97	FEB 28	6.37	APR 30	5.13	JUN 30	6.07	AUG 31	6.31
NOV 30	5.82	JAN 31	5.30	MAR 31	6.35	MAY 31	4.94	JUL 31	6.22	SEP 30	6.00

BARRY COUNTY

424540085232001. Local number, 4N 9W 5DAAA.
LOCATION.--Lat 42°45'40", long 085°23'20", Hydrologic Unit 04050007, on Solomon Road 4 mi east and 3.5 mi north of Middleville.
Owner: State Department of Natural Resources.
AQUIFER.--Glacial deposits of Pleistocene age.
WELL CHARACTERISTICS.--Drilled water table well, diameter 2 in, depth 131 ft.
DATUM.--Altitude of land-surface datum is 860 ft. Measuring point: Top of casing, 2 ft above land-surface datum.
PERIOD OF RECORD.--December 1964 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 111.5 ft below land-surface datum, Mar. 20, 1978; lowest measured, 122.0 ft Mar. 5, 1965.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 5	116.4	DEC 27	116.7	MAY 4	116.7	JUL 28	116.0

BAY COUNTY

435128083582401. Local number, 17N 4E 22DCAA.
LOCATION.--Lat 43°51'28", long 083°58'24", Hydrologic Unit 04080102, at end of Second Street, Pinconning.
Owner: Pinconning Township.
AQUIFER.--Saginaw Formation of Pennsylvanian age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in, depth 110 ft, cased to 60 ft, open end.
DATUM.--Altitude of land-surface datum is 620 ft. Measuring point: Plywood shelter base, 2.00 ft above land-surface datum.
REMARKS.--Water levels affected by regional pumping.
PERIOD OF RECORD.-August 1962 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 0.05 ft below land-surface datum, Mar. 5, 1976; lowest, 10.53 ft Aug. 8, 1963.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 18	2.64	JAN 6	1.56	MAR 31	1.30	JUN 8	1.73	JUL 11	3.17	AUG 15	4.70
NOV 30	2.07	FEB 16	1.28	MAY 4	1.27						

BRANCH COUNTY

415602084593701. Local number, 6S 6W 22CABA.
LOCATION.--Lat 41°56'02", long 084°59'37", Hydrologic Unit 04050001, at Bennett and Tibbits Streets, Coldwater.
Owner: City of Coldwater.
AQUIFER.--Sand and gravel of Pleistocene age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in, depth 113 ft, screened 73 to 113 ft.
DATUM.--Altitude of land-surface datum is 970 ft. Measuring point: Plywood shelter base, 2.50 ft above land-surface datum.
REMARKS.--Water levels affected by nearby pumping.
PERIOD OF RECORD.--January 1964 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 9.0 ft below land-surface datum, May 6, 1975; lowest, 25.9 ft May 25, 1977.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	21.7	21.2	20.4	19.6	13.8	12.6	16.0	--	11.2	21.1	20.8	13.8
10	14.7	15.8	14.0	19.7	20.2	14.4	11.7	--	19.1	12.6	22.3	13.9
15	14.7	21.6	14.5	13.3	21.0	20.6	19.5	--	21.0	22.4	18.2	21.6
20	22.7	15.5	20.8	20.7	12.5	13.0	--	--	21.6	22.4	13.6	23.1
25	21.6	14.6	12.4	20.3	20.4	17.3	--	20.4	19.1	22.0	21.6	13.8
EOM	14.5	20.7	12.2	21.3	20.4	20.1	--	19.5	21.5	13.0	22.9	15.8

WTR YEAR 1983 MAX 10.0 MAY 26, 1983 MIN 23.1 SEP 20, 1983

CALHOUN COUNTY

422422085071501. Local number, 1S 7W 10BBAB.
LOCATION.--Lat 42°24'22", long 085°07'15", Hydrologic Unit 04050003, at highways M-78 and M-66, 5 mi north of Battle Creek.
Owner: Rilla Sabin.
AQUIFER.--Glacial deposits of Pleistocene age.
WELL CHARACTERISTICS.--Dug water-table well, diameter 15 in, depth 12 ft, open tile bottom.
DATUM.--Land-surface datum is 907.99 ft National Geodetic Vertical Datum of 1929. Measuring point: Top of casing, 1.50 ft above land-surface datum.
REMARKS.--Measured by observer.
PERIOD OF RECORD.--September 1946 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 0.89 ft below land-surface datum, Mar. 28, 1950; lowest, dry, July 29, 1964.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 6	4.34	DEC 8	4.30	FEB 9	4.24	APR 13	3.50	JUN 15	3.18	AUG 10	3.80
13	4.40	15	4.27	16	4.21	20	3.04	22	3.40	17	4.00
20	4.44	22	4.24	23	4.18	27	2.98	29	3.38	24	4.07
27	4.56	29	3.90	MAR 2	4.14	MAY 4	2.98	JUL 6	3.40	31	4.05
NOV 3	4.54	JAN 5	3.94	9	4.14	11	2.92	13	3.46	SEP 7	4.04
10	4.44	12	4.10	16	4.12	18	2.88	20	3.60	14	4.08
17	4.36	19	4.30	23	4.12	25	2.90	27	3.68	21	4.10
24	4.32	26	4.32	30	4.10	JUN 1	2.92	AUG 3	3.70	28	4.11
DEC 1	4.31	FEB 2	4.30	APR 6	3.72	8	3.00				

CALHOUN COUNTY

422025085084001. Local number, 1S 7W 32DABA.
LOCATION.--Lat 42°20'25", long 085°08'40", Hydrologic Unit 04050003, at Verona well field, Battle Creek.
Owner: City of Battle Creek.
AQUIFER.--Marshall Formation of Mississippian age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 8 in, depth 127 ft, cased to 103 ft.
DATUM.--Land-surface datum is 830.79 ft National Geodetic Vertical Datum of 1929. Measuring point: Recorder base, 2.10 ft above land-surface datum.
REMARKS.--Water levels affected by nearby municipal pumping. Measurements made daily by Water Department.
PERIOD OF RECORD.--October 1939 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 0.7 ft below land surface datum, Apr. 26-27, 1950; lowest, 16.75 ft July 16, 1959.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	10.90	10.70	8.00	9.50	7.40	7.80	7.50	6.90	--	8.00	10.50	10.50
10	9.20	9.90	9.50	8.30	8.30	8.00	7.20	6.60	--	9.80	12.10	10.40
15	10.00	9.60	8.70	8.40	8.50	7.70	6.70	7.60	--	9.90	10.80	11.10
20	9.90	9.20	8.10	8.35	7.30	7.05	7.00	7.40	--	11.00	11.00	11.10
25	10.30	9.05	7.90	7.90	8.80	8.10	7.70	7.50	--	9.70	11.20	10.30
EOM	8.90	8.40	8.50	7.80	8.00	7.60	7.80	7.50	--	10.20	11.20	10.40

CASS COUNTY

414651085575601. Local number, 8S 14W 17BAAA.
LOCATION.--Lat 41°46'51", long 085°57'56", Hydrologic Unit 04050001, 2 mi east of Adamsville on U.S. Highway 112.
Owner: Ted Little.
AQUIFER.--Glacial deposits of Pleistocene age.
WELL CHARACTERISTICS.--Dug water-table well, diameter 28 in, depth 55 ft, cribbed with brick to open bottom.
DATUM.--Altitude of land-surface datum is 840 ft. Measuring point: Top of wooden platform, 1.00 ft above land-surface datum.
REMARKS.--Measured by observer.
PERIOD OF RECORD.--September 1945 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 46.20 ft below land-surface datum, July 16, 1950; lowest, dry, Mar. 10, 1947.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 26	47.55	DEC 28	47.40	FEB 23	49.10	MAY 27	48.60	JUL 27	48.20	SEP 26	48.30
NOV 23	47.50	JAN 24	49.00	APR 25	49.00	JUN 27	48.30	AUG 23	48.40		

CHEBOYGAN COUNTY

454427084424001. Local number, 39N 3W 29CBCB1.
LOCATION.--Lat 45°44'27", long 084°42'40", Hydrologic Unit 04070003, on Stimpson Rd. 3 mi southeast of Mackinaw City.
Owner: U.S. Geological Survey.
AQUIFER.--Dundee Formation of Devonian age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in, depth 121 ft cased to 104 ft, open end.
DATUM.--Altitude of land-surface datum is 705 ft. Measuring point: Top of casing, 2 ft above land-surface datum.
PERIOD OF RECORD.--January 1979 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 5.25 ft below land-surface datum, May 12, 1979; lowest measured, 11.68 ft Feb. 11, 1981.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 5	9.11	DEC 8	6.30	FEB 10	7.25	APR 13	5.74	JUN 16	6.19	AUG 31	10.53
NOV 9	7.59	JAN 18	6.70	MAR 1	6.81	MAY 16	5.52	JUL 26	9.40		

CHEBOYGAN COUNTY

454427084424002. Local number, 39N 3W 29CBCB2.
LOCATION.--Lat 45°44'27", long 084°42'40", Hydrologic Unit 04070003, on Stimpson Rd. 3 mi southeast of Mackinaw City.
Owner: U.S. Geological Survey.
AQUIFER.--Sand and gravel of Pleistocene age.
WELL CHARACTERISTICS.--Drilled water table well, diameter 6 in, depth 55 ft, screened 40 to 55 ft.
DATUM.--Altitude of land-surface datum is 705 ft. Measuring point: Top of casing, 2.5 ft above land-surface datum.
PERIOD OF RECORD.--February 1979 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 2.07 ft below land-surface datum, May 12, 1979; lowest measured, 6.47 ft Feb. 11, 1982.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 5	4.41	DEC 8	2.51	FEB 10	3.09	APR 13	2.07	JUN 16	2.57	AUG 31	5.59
NOV 9	3.49	JAN 18	2.76	MAR 1	2.53	MAY 16	2.11	JUL 26	4.87		

CHIPPEWA COUNTY

462159084442201. Local number, 46N 4W 24DADA.
LOCATION.--Lat 46°21'59:, long 084°44'22", Hydrologic Unit 04020203, on trail 0.2 mi south of highway M-28 and 1 mi west of Raco.
Owner: U.S. Forest Service.
AQUIFER.--Glacial deposits of Pleistocene age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in, depth 54 ft.
DATUM.--Altitude of land-surface datum is 850 ft. Measuring point: Top of shelter base, 3.07 ft above land-surface datum.
PERIOD OF RECORD.--June 1952 to April 1965. November 1969 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 18.40 ft below land-surface datum, June 7, 1971; lowest, 28.43 ft Apr. 14, 1964.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	25.43	25.41	25.02	24.45	24.13	24.49	24.25	23.23	22.87	22.80	23.31	23.85
10	25.45	25.38	24.94	24.34	24.19	24.57	24.21	23.13	22.82	22.83	23.39	23.96
15	25.47	25.34	24.83	24.22	24.22	24.57	24.11	23.01	22.74	22.89	23.50	24.05
20	25.52	25.32	24.78	24.14	24.30	24.51	23.99	22.98	22.71	22.98	23.60	24.14
25	25.53	25.23	24.62	24.08	24.35	24.48	23.72	22.93	22.69	23.09	23.68	24.24
EOM	25.48	25.14	24.50	24.10	24.38	24.33	23.45	22.93	22.70	23.18	23.79	24.33

WTR YEAR 1983 MAX 22.66 JUN 25, 1983 MIN 25.54 OCT 26, 1982

CLINTON COUNTY

425410084323501. Local number, 6N 2W 16DDAD.
LOCATION.--Lat 42°54'10", long 084°32'35", Hydrologic Unit 04050005, at U.S. Highway 27, 6 mi south of St. Johns.
Owner: State Highway Department.
AQUIFER.--Gravel of Pleistocene age.
WELL CHARACTERISTICS.--Driven observation water-table well, diameter 2 in, depth 26 ft, screened 23 to 26 ft.
DATUM.--Land-surface datum is 803.32 ft National Geodetic Vertical Datum of 1929. Measuring point: Top of casing, 1.30 ft above land-surface datum.
REMARKS.--Federal key well.
PERIOD OF RECORD.--August 1948 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 13.84 ft below land-surface datum, Apr. 30, 1974; lowest measured, 19.93 ft Feb. 27, 1964.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 25	18.50	DEC 21	17.84	FEB 22	17.53	APR 22	15.67	JUN 23	16.30	AUG 22	17.69
NOV 22	18.38	JAN 24	17.44	MAR 23	17.23	MAY 20	15.42	JUL 25	17.18	SEP 26	17.97

CRAWFORD COUNTY

443308084245001. Local number, 25N 1W 15DDCD.
LOCATION.--Lat 44°33'08", long 084°24'50", Hydrologic Unit 04070007, 2.6 mi south of Eldorado on Highway M-18.
Owner: U.S. Forest Service.
AQUIFER.--Glacial deposits of Pleistocene age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in, depth 56 ft, cased.
DATUM.--Altitude of land-surface datum is 1,190 ft. Measuring point: Top of shelter base, 2.95 ft above land-surface datum.
PERIOD OF RECORD.--November 1948 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 25.71 ft below land-surface datum, May 10, 1976; lowest, 35.97 ft Apr. 4-6, 1951.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	30.74	--	31.15	30.88	30.51	30.52	30.62	30.39	29.61	28.79	28.60	--
10	30.77	--	31.14	30.79	30.49	30.54	30.59	30.31	29.49	28.70	28.65	--
15	30.81	--	31.13	30.70	30.47	30.57	30.56	30.18	29.33	28.62	28.67	--
20	30.86	31.06	31.11	30.66	30.48	30.58	30.55	30.05	29.20	28.57	--	29.02
25	30.93	31.15	31.08	30.57	30.49	30.63	30.51	29.93	29.05	28.55	--	29.10
EOM	30.95	31.15	30.96	30.52	30.50	30.63	30.46	29.74	28.91	28.57	--	29.14

WTR YEAR 1983 MAX 28.53 JUL 23, 1983 MIN 31.20 DEC 7, 1942

DELTA COUNTY

454446087090401. Local number, 39N 23W 28ACC.
LOCATION.--Lat 45°44'46", long 087°09'04", Hydrologic Unit 04030111, 3.5 mi west of Escanaba.
Owner: M. Blake
AQUIFER.--Munising Sandstone of Cambrian age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 5 in, depth 530 ft.
DATUM.--Altitude of land-surface datum is 680 ft. Measuring point: Top of shelter base, 3.39 ft above land-surface datum.
PERIOD OF RECORD.--July 1968 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 1.5 ft below land-surface datum, May 6, 1960; lowest, 8.9 ft Feb. 6, 1977.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	5.76	5.37	5.04	--	4.98	--	4.80	4.64	--	5.31	6.50	6.63
10	5.60	5.40	5.00	--	4.99	4.52	4.68	--	--	5.67	6.70	6.60
15	5.48	5.12	5.03	--	4.94	4.50	4.49	--	--	6.01	6.29	6.77
20	5.50	5.09	4.97	--	4.92	4.61	4.60	4.55	4.85	6.28	6.53	6.25
25	5.38	5.06	--	4.87	4.97	4.72	4.62	--	5.05	6.24	6.61	6.12
EOM	5.35	5.02	--	4.86	4.94	4.81	4.67	--	5.20	6.27	6.44	6.22

WTR YEAR 1983 MAX 4.33 APR 14, 1983 MIN 6.77 SEP 15, 1983

DICKINSON COUNTY

460458087493901. Local number, 43N 28W 32ADAB.
LOCATION.--Lat 46°04'58", long 087°49'39", Hydrologic Unit 04030109, 6.25 mi north of Felch.
Owner: State Department of Natural Resources.
AQUIFER.--Sand of Pleistocene age.
WELL CHARACTERISTICS.--Augered water-table well, diameter, 1¼ in, depth 31 ft screened 29 to 31 ft.
DATUM.--Altitude of land-surface datum is 1,160 ft. Measuring point: Hole in top of cap, 4.00 ft above land-surface datum.
PERIOD OF RECORD.--October 1966 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 13.10 ft below land-surface datum, May 17, 1972; lowest measured, 16.50 ft Mar. 2, 1977.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 2	14.47	DEC 29	14.39	MAR 2	14.89	APR 28	13.87	JUN 28	13.54	SEP 6	14.74
NOV 29	14.32	FEB 1	14.71	MAR 30	14.48	MAY 27	13.59	JUL 29	14.20		

EATON COUNTY

424435084365001. Local number, 4N 3W 12CDAD.
LOCATION.--Lat 42°44'35", long 084°36'50", Hydrologic Unit 04050004, north of M-43, 0.5 mi west of Lansing.
Owner: F. Wheeler.
AQUIFER.--Saginaw Formation of Pennsylvanian age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in, depth 381 ft, cased to 140 ft.
DATUM.--Land-surface datum is 862.91 ft National Geodetic Vertical Datum of 1929. Measuring point: Plywood instrument shelf, 1.00 ft above land-surface datum.
REMARKS.--Water levels affected by pumping.
PERIOD OF RECORD.--October 1953 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 67.5 ft below land-surface datum, Nov. 23, 1953; lowest, 103.6 ft Aug. 28, 1969.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	87.7	88.2	84.8	83.9	89.8	88.1	84.8	86.4	87.1	89.5	90.6	87.5
10	88.1	87.3	85.1	85.7	89.6	88.5	84.4	85.8	87.8	91.9	90.3	86.8
15	86.5	86.4	84.3	87.0	88.5	88.5	84.8	88.6	89.8	96.1	88.1	88.0
20	86.8	86.3	82.7	87.6	88.0	88.0	86.1	81.3	91.4	94.0	87.6	81.5
25	86.9	86.5	84.3	87.0	87.2	87.9	87.8	86.7	96.7	89.0	86.2	79.2
EOM	88.5	84.9	83.4	88.7	87.4	85.0	87.3	86.5	90.4	87.7	91.3	78.6

WTR YEAR 1983 MAX 77.2 SEP 27, 1983 MIN 96.7 JUN 25, 1983

GENESEE COUNTY

425552083382801. Local number, 6N 7E 9DCCC.
LOCATION.--Lat 42°55'52", long 083°38'28", Hydrologic Unit 04080204, at Fisher Body Plant, Grand Blanc.
Owner: General Motors Corporation.
AQUIFER.--Saginaw Formation of Pennsylvanian age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 10 in, depth 385 ft, cased to 150 ft.
DATUM.--Land-surface datum is 837.0 ft National Geodetic Vertical Datum of 1929. Measuring point: Base for recorder, 1.50 ft above land-surface datum.
REMARKS.--Water levels affected by nearby pumping. Measurements made by Plant Water Department.
PERIOD OF RECORD.--January 1974 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 52.3 ft below land-surface datum, Dec. 29, 1975; lowest, 87.0 ft June 29, 1977.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	65.6	64.2	59.0	62.2	60.6	60.1	57.4	58.7	58.2	62.3	67.7	67.7
10	65.3	64.5	59.2	60.9	60.5	57.5	59.0	61.1	60.5	59.2	67.2	68.6
15	65.4	64.4	59.4	64.8	59.6	59.7	55.6	63.7	59.0	75.2	67.4	65.3
20	65.1	64.0	57.2	61.6	62.4	59.9	56.4	58.8	66.5	79.4	67.1	62.0
25	65.9	61.0	67.9	61.4	62.2	59.4	58.5	57.0	75.9	66.2	70.4	66.6
EOM	65.0	59.6	--	63.0	62.1	56.1	58.8	55.5	--	67.0	71.4	64.6

WTR YEAR 1983 MAX 54.2 MAY 30, 1983 MIN 76.6 JUN 27, 1983

GRAND TRAVERSE COUNTY

443921085213501. Local number, 26N 9W 14ABAA.
LOCATION.--Lat 44°39'21", long 085°21'35", Hydrologic Unit 04060105, 5.5 mi north of Fife Lake.
Owner: U.S. Geological Survey.
AQUIFER.--Sand of Pleistocene age.
WELL CHARACTERISTICS.--Drilled water-table well, diameter 6 in, depth 80 ft, PVC pipe and screen.
DATUM.--Altitude of land-surface datum is 960 ft. Measuring point: Plywood instrument shelf, 2.85 ft above land-surface datum.
PERIOD OF RECORD.--June 1976 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 23.32 ft below land-surface datum, June 17, 1976; lowest, 28.05 ft, Apr. 3, 1982.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	26.62	26.93	27.13	26.61	26.40	26.40	26.34	26.07	25.27	24.78	24.88	25.17
10	26.67	26.98	27.12	26.55	26.37	26.41	26.30	26.00	25.17	24.74	24.92	25.23
15	26.72	27.03	27.04	26.51	26.36	26.43	26.27	25.92	25.07	24.73	24.97	25.29
20	26.78	27.07	26.91	26.48	26.37	26.41	26.23	25.79	24.98	24.75	25.03	25.34
25	26.83	27.10	26.79	26.44	26.38	26.40	26.19	25.61	24.90	24.79	25.07	25.41
EOM	26.88	27.12	26.69	26.41	26.38	26.35	26.14	25.40	24.82	24.82	25.13	25.46

WTR YEAR 1983 MAX 24.73 JUL 11, 1983 MIN 27.14 DEC 7, 1982

HILLSDALE COUNTY

415154084315401. Local number, 7S 2W 15BCBA1.
LOCATION.--Lat 41°51'54", long 084°31'54", Hydrologic Unit 04100003, at Trail and Bird Lake Roads 7 mi southeast of Hillsdale.
Owner: U.S. Geological Survey.
AQUIFER.--Sand of Pleistocene age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in, depth 150 ft, screened 135 to 150 ft.
DATUM.--Altitude of land-surface datum is 1,092 ft. Measuring point: Top of casing, 2.5 ft above land-surface datum.
PERIOD OF RECORD.--November 1978 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 46.14 ft below land-surface datum, Apr. 13, 1982; lowest measured, 49.00 ft Mar. 15, 1979.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 26	47.41	JAN 18	47.35	APR 12	47.20	JUL 5	46.71	AUG 16	47.17	SEP 27	47.58
DEC 6	47.36	MAR 1	47.26	MAY 24	46.40						

HILLSDALE COUNTY

415236084313701. Local number, 7S 2W 10BDDD.
LOCATION.--Lat 41°52'36", long 084°31'37", Hydrologic Unit 04100003, 2.5 mi west of Pittsford on M-43.
Owner: State Department of Natural Resources.
AQUIFER.--Sand of Pleistocene age.
WELL CHARACTERISTICS.--Augered water-table well, diameter 1¼ in, depth 20 ft, screened 17 to 20 ft.
DATUM.--Altitude of land-surface datum is 1,070 ft. Measuring point: Top of casing, 4.00 ft above land-surface datum.
PERIOD OF RECORD.--December 1965 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 5.79 ft below land-surface datum, Apr. 13, 1982; lowest measured, 11.1 ft, Sept. 21, 1967.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 26	8.42	JAN 18	7.75	APR 12	7.03	JUL 5	7.37	AUG 16	7.92	SEP 27	8.55
DEC 6	7.25	MAR 1	7.90	MAY 24	6.55						

INGHAM COUNTY

424424084340301. Local number, 4N 2W 17ABAA.
LOCATION.--Lat 42°44'24", long 084°34'03", Hydrologic Unit 04050004, at Kirby and Logan Streets, Lansing.
Owner: City of Lansing.
AQUIFER.--Saginaw Formation of Pennsylvanian age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 20 in, depth 424 ft.
DATUM.--Land-surface datum is 858.72 ft National Geodetic Vertical Datum of 1929. Measuring point: Plywood shelter base, 0.5 ft above land-surface datum.
REMARKS.--Water levels affected by regional pumping.
PERIOD OF RECORD.--December 1929 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 34.3 ft below land-surface datum, Dec. 1929; lowest, 168.3 ft May 7, 1968.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	109.9	109.1	107.7	106.0	105.0	--	--	--	101.7	101.6	--	101.0
10	109.6	109.1	107.7	105.2	--	104.0	103.6	103.1	101.7	101.7	--	100.9
15	109.5	109.0	107.6	105.4	--	103.9	--	102.7	101.4	101.8	--	100.8
20	109.6	108.5	107.1	105.6	--	--	--	102.6	101.4	102.0	--	99.9
25	109.6	108.6	106.8	105.1	--	--	--	102.4	101.6	101.7	101.5	99.8
EOM	109.1	107.7	106.4	105.0	--	--	--	101.8	101.6	--	101.4	99.4

WTR YEAR 1983 MAX 99.2 SEP 30, 1983 MIN 110.0 OCT 1, 1982

IOSCO COUNTY

442839083312301. Local number, 24N 7E 13ADAD1.
LOCATION.--Lat 44°28'39", long 083°31'23", Hydrologic Unit 04070007, 10 mi west of Oscoda.
Owner: U.S. Geological Survey.
AQUIFER.--Sand of Pleistocene age.
WELL CHARACTERISTICS.--Drilled water table well, diameter 6 in, depth 69 ft, screened 54 to 69 ft.
DATUM.--Altitude of land-surface datum is 760 ft. Measuring point: Top of casing, 2.5 ft above land-surface datum.
PERIOD OF RECORD.--June 1980 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 29.67 ft below land-surface datum, July 14, 1980; lowest measured, 32.71 ft Mar. 23, 1982.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 5	32.00	DEC 14	32.42	FEB 8	32.71	MAY 3	31.79	JUL 12	29.86	SEP 28	30.21
NOV 16	32.23	JAN 12	32.61	APR 12	32.48	JUN 14	30.42	AUG 23	29.88		

IRON COUNTY

461257088542001. Local number, 44N 37W 14BBCA.
LOCATION.--Lat 46°12'57", long 088°54'20", Hydrologic Unit 04030106, 0.5 mi south of Elmwood on FFH 16.
Owner: State Highway Department.
AQUIFER.--Sand and gravel of Pleistocene age.
WELL CHARACTERISTICS.--Driven water-table well, diameter 6 in, depth 102 ft.
DATUM.--Altitude of land-surface datum is 1,730 ft. Measuring point: Top of plywood shelter base, 4.21 ft above land-surface datum.
PERIOD OF RECORD.--October 1959 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 91.79 ft below land-surface datum, Sept. 14, 1983: lowest measured, 97.11 ft Aug. 16, 1982.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
DEC 7	96.45	MAR 24	96.09	JUN 2	92.34	SEP 14	91.79

JACKSON COUNTY

421346084230801. Local number, 3S 1W 11AADD1.
LOCATION.--Lat 42°13'46", long 084°23'08", Hydrologic Unit 04050004, at Belden and Mansion Street, Jackson.
Owner: City of Jackson.
AQUIFER.--Saginaw Formation of Pennsylvanian age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 16 in, depth 360 ft, open bottom.
DATUM.--Altitude of land-surface datum is 935 ft. Measuring point: Plywood recorder shelf, 5.50 ft above land-surface datum.
REMARKS.--Measured by owner; water levels affected by pumping; lowest monthly reading shown.
PERIOD OF RECORD.--June 1957 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 18.6 ft below land-surface datum, Jan. 2, 1961; lowest measured, 119.1 ft June 30, 1971.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 27	75.1	DEC 3	74.3	FEB 4	65.8	APR 28	79.5	JUN 24	89.0	AUG 31	82.4
NOV 12	64.2	JAN 28	74.1	MAR 31	77.0	MAY 12	79.9	JUL 15	87.2	SEP 7	86.0

KALAMAZOO COUNTY

421641085350601. Local number, 2S 11W 22CDBB.
LOCATION.--Lat 42°16'41", long 085°35'06", Hydrologic Unit 04050003, at southwest corner Crosstown Parkway and Stockbridge Avenue, Kalamazoo.
Owner: City of Kalamazoo.
AQUIFER.--Glacial deposits of Pleistocene age.
WELL CHARACTERISTICS.--Drilled water-table well, diameter 4 in, depth 137 ft, screened 134 to 137 ft.
DATUM.--Land-surface datum is 764.7 ft National Geodetic Vertical Datum of 1929. Measuring point: Top of casing, 2.00 ft above land surface datum.
REMARKS.--Water levels affected by nearby pumping.
PERIOD OF RECORD.--August 1960 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 4.81 ft below land-surface datum, Feb. 5, 1975; lowest, 31.08 ft Aug. 19, 1961.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	10.57	10.71	10.48	10.02	9.43	9.11	8.84	8.44	7.98	8.08	8.55	8.93
10	10.59	10.71	10.41	9.92	9.36	9.08	8.78	8.39	7.93	8.12	8.65	8.97
15	10.61	10.70	10.32	9.80	9.32	9.05	8.73	8.33	7.93	8.19	8.70	9.00
20	10.61	10.65	10.27	9.67	9.25	9.02	8.65	8.26	7.95	8.27	8.76	9.02
25	10.62	10.58	10.21	9.59	9.18	8.98	8.56	8.17	8.00	8.36	8.80	9.02
EOM	10.71	10.53	10.07	9.50	9.16	8.91	8.50	8.06	8.05	8.47	8.88	9.02

WTR YEAR 1983 MAX 7.92 JUN 11, 1983 MIN 10.71 OCT 29, 1982

KALAMAZOO COUNTY

421325085404801. Local number, 3S 12W 11BDAD.
LOCATION.--Lat 42°13'25", long 085°40'48", Hydrologic Unit 04050003, at Kalamazoo Community College.
Owner: City of Kalamazoo.
AQUIFER.--Glacial deposits of Pleistocene age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 3 in, depth 248 ft.
DATUM.--Altitude of land-surface is 880 ft. Measuring Point: Top of shelter base, 4.0 ft above land-surface datum.
PERIOD OF RECORD.--March 1961 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, +2.98 ft above land-surface datum, Sept. 4, 1969; lowest, 1.04 ft below land-surface datum, Aug. 4, 1977.

WATER LEVEL, IN FEET ABOVE AND BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	--	--	--	--	+0.61	+0.60	+0.16	+0.47	--	--	-0.10	-0.05
10	--	--	--	--	+0.64	+0.59	+0.06	+0.55	--	0.0	-0.10	-0.06
15	--	--	--	--	+0.65	+0.57	+0.05	+0.57	--	-0.12	-0.15	-0.10
20	--	--	--	+0.70	+0.64	+0.57	+0.02	+0.83	--	-0.19	-0.06	+0.19
25	--	--	--	+0.65	+0.61	+0.57	+0.33	+0.83	--	-0.09	-0.05	+0.30
EOM	+0.68	--	--	+0.65	+0.63	+0.28	+0.41	--	--	-0.15	-0.04	+0.30

WTR YEAR 1983 MAX +1.18 MAY 19, 1983 MIN -0.20 JUL 19, 1983

KENT COUNTY

425030085434901. Local number, 5N 12W 4DCCD.
LOCATION.--Lat 42°50'30", long 085°43'49", Hydrologic Unit 04050006, 2.1 mi north of Byron Center and 0.4 mi west of Byron Center Road.
Owner: City of Wyoming.
AQUIFER.--Sand and gravel of Pleistocene age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in, depth 86 ft.
DATUM.--Land-surface datum is 685.97 ft National Geodetic Vertical Datum of 1929. Measuring point: Top of shelter base, 2.50 ft above land-surface datum.
REMARKS.--Monthly measurements begun August 1978.
PERIOD OF RECORD.--October 1962 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 8.28 ft below land-surface datum, Apr. 14, 1974; lowest, 12.91 ft Aug. 19, 1964.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 15	10.66	FEB 8	10.02	MAY 5	9.36	JUN 14	10.00	JUL 28	10.70	SEP 8	10.98
DEC 27	9.44	MAR 23	9.98								

LAKE COUNTY

440737085483701. Local number, 20N 13W 13ACAC1.
LOCATION.--Lat 44°07'37", long 085°48'37", Hydrologic Unit 04060103, 5 mi east of Irons.
Owner: U.S. Geological Survey.
AQUIFER.--Outwash deposits of Pleistocene age.
WELL CHARACTERISTICS.--Drilled water table well, diameter 6 in, depth 57 ft, screened 42 to 57 ft.
DATUM.--Altitude of land-surface datum is 945 ft. Measuring point: Top of casing 9.0 ft above land-surface datum.
PERIOD OF RECORD.--March 1980 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 14.70 ft below land-surface datum, July 22, 1980; lowest measured, 17.71 ft Mar. 14, 1980.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 13	16.64	DEC 14	16.21	FEB 24	16.00	MAY 4	15.64	JUL 15	15.17	SEP 22	16.02
NOV 16	16.99	JAN 26	15.81	MAR 30	16.22	JUN 8	15.04	AUG 18	15.46		

LEELANAU COUNTY

445020086012201. Local number, 28N 14W 8DDCA1.
LOCATION.--Lat 44°50'20", long 086°01'22", Hydrologic Unit 04060104, 2.5 mi northeast of Empire.
Owner: U.S. Geological Survey.
AQUIFER.--Sand of Pleistocene age.
WELL CHARACTERISTICS.--Drilled water table well, diameter 6 in, depth 138 ft, screened 123 to 138 ft.
DATUM.--Altitude of land-surface datum is 750 ft. Measuring point: Top of casing 2.0 ft above land surface datum.
PERIOD OF RECORD.--February 1978 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 113.12 ft below land-surface datum, Mar. 21, 1980; lowest measured, 114.49 ft, June 21, 1983.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 14	113.98	DEC 13	114.14	MAR 7	114.31	MAY 18	114.45	JUL 27	114.30	AUG 23	114.21
NOV 17	114.17	FEB 1	114.30	APR 13	114.37	JUN 21	114.49				

LEELANAU COUNTY

445011086031401. Local number, 28N 14W 18BABB1.
LOCATION.--Lat 44°50'11", long 086°03'14", Hydrologic Unit 04060104, 2 mi north of Empire.
Owner: U.S. Geological Survey.
AQUIFER.--Sand of Pleistocene age.
WELL CHARACTERISTICS.--Drilled water table well, diameter 6 in, depth 60 ft, screened 45 to 60 ft.
DATUM.--Altitude of land-surface datum is 625 ft. Measuring point: Top of casing 2.0 ft above land-surface datum.
PERIOD OF RECORD.--November 1979 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 22.91 below land-surface datum, Apr. 12, 1982; lowest, 24.76 ft Sept. 29, 1982.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	24.78	24.85	24.50	--	24.22	24.12	23.98	23.81	23.43	23.56	23.86	24.12
10	24.80	24.87	24.44	--	24.25	24.07	23.14	23.78	23.32	23.59	23.90	24.16
15	24.82	24.79	24.35	--	24.26	24.02	23.95	23.73	23.28	23.65	23.95	24.20
20	24.83	24.66	24.24	--	24.26	23.98	23.92	23.70	23.32	23.71	24.00	24.22
25	24.84	24.57	24.16	--	24.20	23.97	23.89	23.66	23.40	23.76	24.03	24.20
EOM	24.83	24.52	--	24.22	24.17	23.15	23.85	23.54	23.47	23.81	24.08	24.17

WTR YEAR 1983 MAX 23.00 MAR 26, 1983 MIN 24.87 NOV 8, 1982

LENAWEE COUNTY

420246084150601. Local number, 5S 1E 12DDBD.
LOCATION.--Lat 42°02'46", long 084°15'06", Hydrologic Unit 04100002, 2 mi west of Cambridge Junction on the Onsted State Game Area.
Owner: State Department of Natural Resources.
AQUIFER.--Sand of Pleistocene age.
WELL CHARACTERISTICS.--Drilled water-table well, diameter 1¼ in, depth 39 ft, screened 36 to 39 ft.
DATUM.--Altitude of land-surface datum is 1,000 ft. Measuring point: Top of casing, 3.00 ft above land-surface datum.
PERIOD OF RECORD.--December 1965 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 15.89 ft below land-surface datum, Mar. 26, 1982; lowest measured, 19.33 ft Sept. 2, 1971.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 5	17.39	JAN 3	16.73	MAR 28	16.50	JUN 20	16.95	AUG 4	17.00	SEP 16	17.64
NOV 19	16.97	FEB 23	16.80	MAY 10	16.13						

LIVINGSTON COUNTY

422853083402801. Local number, 1N 6E 13DBAB.
LOCATION.--Lat 42°28'53", long 083°40'28", Hydrologic Unit 04090005, 2 mi northwest of South Lyon on Twelve Mile Road.
Owner: American Aggregate Corporation.
AQUIFER.--Glacial deposits of Pleistocene age.
WELL CHARACTERISTICS.--Drilled water-table well, diameter 2 in, depth 29 ft, 1¼ in diameter screen.
DATUM.--Altitude of land-surface datum is 930 ft. Measuring point: Plywood instrument shelf, 2.50 ft above land-surface datum.
PERIOD OF RECORD.--April 1970 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 12.1 ft below land-surface datum, Apr. 22, 1974; lowest, 21.58 ft Oct. 30, 31, Nov. 1, 1979.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	15.12	15.46	15.59	15.78	15.93	16.00	15.67	14.63	13.81	14.35	14.82	15.23
10	15.12	15.37	15.68	15.79	15.93	16.00	15.45	14.52	13.76	14.41	14.92	15.33
15	15.25	15.13	15.68	15.81	15.95	16.00	15.35	14.36	13.72	14.50	14.99	15.43
20	15.25	15.44	15.72	15.85	15.98	15.83	15.13	14.20	13.73	14.55	14.97	15.42
25	15.26	15.55	15.75	15.88	15.98	15.97	14.93	13.98	13.86	14.57	15.11	15.45
EOM	15.27	15.62	15.78	15.89	15.99	15.75	14.78	13.92	14.16	14.73	15.19	15.54

WTR YEAR 1983 MAX 13.67 JUN 12, 1983 MIN 16.00 MAR 3, 1983

MACKINAC COUNTY

460321084354801. Local number, 42N 2W 7AABB.
LOCATION.--Lat 46°03'21", long 084°35'48", Hydrologic Unit 04070002, 2 mi north of Pontchartrain Shores at Pontchartrain and St. Ignace Roads.
Owner: U.S. Forest Service.
AQUIFER.--Manistique Dolomite of Silurian age.
WELL CHARACTERISTICS.--Drilled water-table well, diameter 6 in, depth 102 ft.
DATUM.--Altitude of land-surface datum is 650 ft. Measuring point: Top of shelter floor, 2.3 ft above land-surface datum.
PERIOD OF RECORD.--June 1956 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 13.1 ft below land-surface datum, May 11, 1960; lowest, 32.3 ft Feb. 7, 1977.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	25.21	22.82	21.78	20.75	24.15	23.30	22.05	22.17	19.76	24.65	27.19	28.79
10	23.88	23.29	19.70	21.73	24.60	18.00	21.30	20.05	21.08	25.08	27.51	29.06
15	21.82	19.87	21.30	21.94	24.83	20.00	19.90	21.00	21.97	25.47	27.85	29.33
20	21.13	21.05	22.30	22.80	25.02	19.80	19.95	21.21	22.86	25.91	28.09	29.35
25	21.50	20.37	21.40	23.27	24.61	20.99	21.20	21.30	23.49	26.33	28.40	29.51
EOM	22.29	21.51	19.36	23.83	24.57	21.97	22.00	19.45	24.02	26.73	28.64	29.71

WTR YEAR 1983 MAX 17.38 MAR 8, 1983 MIN 29.71 SEP 30, 1983

MARQUETTE COUNTY

462938087475901. Local number, 47N 28W 3CCDC.
LOCATION.--Lat 46°29'38", long 087°47'59", Hydrologic Unit 04020105, 4.8 mi west of Ishpeming on U.S. Highway 41 and M-28.
Owner: Ely Township.
AQUIFER.--Sand and gravel of Pleistocene age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 8 in, depth 72 ft, screened 68 to 72 ft.
DATUM.--Land-surface datum is 1,571.99 ft National Geodetic Vertical Datum of 1929. Measuring point: Top of recorder base, 3.0 ft above land-surface datum.
REMARKS.--Federal key well.
PERIOD OF RECORD.--August 1961 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 9.74 ft below land-surface datum, May 13, 1974; lowest, 19.26 ft Apr. 10-11, 1964.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	14.38	13.79	13.77	14.15	14.72	15.22	14.63	12.40	11.05	11.90	12.94	13.75
10	14.33	13.99	13.81	14.21	14.83	14.78	14.63	12.49	11.07	12.01	13.07	13.79
15	14.06	13.92	13.98	14.32	14.91	14.30	14.52	12.55	11.21	12.20	13.18	13.86
20	14.04	13.75	14.08	14.45	15.02	14.31	13.85	12.61	11.39	12.40	13.34	13.88
25	13.90	13.66	14.15	14.53	15.10	14.42	13.43	12.44	11.53	12.61	13.49	13.69
EOM	13.77	13.67	14.13	14.66	15.14	14.50	12.33	11.67	11.67	12.78	13.66	13.77

WTR YEAR 1983 MAX 10.93 JUN 6, 1983 MIN 15.22 MAR 5, 1983

MENOMINEE COUNTY

453504087331301. Local number, 37N 26W 19DADA.
LOCATION.--Lat 45°35'04", long 087°33'13", Hydrologic Unit 04030108, on Highway U.S. 41 at Carney.
Owner: State Highway Department.
AQUIFER.--Trenton Limestone and Black River Formation of Middle Ordovician age.
WELL CHARACTERISTICS.--Water-table well, diameter 4 in, depth 17 ft, cased.
DATUM.--Altitude of land-surface datum is 800 ft. Measuring point: Top of 2 in reducing nipple, 1.26 ft above land-surface datum.
PERIOD OF RECORD.--September 1959 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 3.47 ft below land-surface datum, Apr. 12, 1979; lowest measured, 8.62 ft Jan. 17, 1977.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 8	4.56	JAN 12	4.67	FEB 2	4.57	MAR 29	3.50	JUN 30	5.24	SEP 14	5.58

MONROE COUNTY

415206083414401. Local number, 7S 6E 15ACAA.
LOCATION.--Lat 41°52'06", long 083°41'44", Hydrologic Unit 04100002, on Teal Road 2 mi southeast of Petersburg.
Owner: U.S. Geological Survey.
AQUIFER.--Detroit River Group of Devonian age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in, depth 72 ft, cased to 53 ft, open end.
DATUM.--Altitude of land-surface datum is 680 ft. Measuring point: Top of casing, 2.5 ft above land-surface datum.
PERIOD OF RECORD.--November 1978 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 32.30 ft below land-surface datum, Mar. 26, 1982; lowest measured, 40.55 ft Nov. 2, 1978.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 5	39.68	JAN 3	37.13	MAR 28	37.08	JUN 6	37.01	AUG 4	38.50	SEP 16	39.84
NOV 19	39.38	FEB 23	36.87	MAY 5	35.08						

MONROE COUNTY

415235083414001. Local number, 7S 6E 15ADBB.
LOCATION.--Lat 41°52'35", long 083°41'50", Hydrologic Unit 04100002, 1.5 mi southeast of Petersburg on Teal Road.
Owner: State Department of Natural Resources.
AQUIFER.--Sand of Pleistocene age.
WELL CHARACTERISTICS.--Drilled water-table well, diameter 1¼ in, depth 17 ft, screened 14 to 17 ft.
DATUM.--Altitude of land-surface datum is 675 ft. Measuring point: Top of casing, 4.00 ft above land-surface datum.
PERIOD OF RECORD.--December 1965 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 3.00 ft below land-surface datum, Feb. 14, 1966; lowest measured, 6.69 ft. Dec. 29, 1976.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 5	6.33	JAN 3	4.85	MAR 28	5.48	JUN 20	4.72	AUG 4	5.04	SEP 16	5.74
NOV 19	5.83	FEB 23	5.29	MAY 5	4.46						

MUSKEGON COUNTY

431806086044401. Local number, 11N 15W 34ADDD.
LOCATION.--Lat 43°18'06", long 086°04'44", Hydrologic Unit 04060102, 8 mi northeast of Holton on Holton-Duck Lake Road.
Owner: State Department of Natural Resources.
AQUIFER.--Sand of Pleistocene age.
WELL CHARACTERISTICS.--Drilled water table well, diameter 1¼ in, depth 31 ft, screened 28 to 31 ft.
DATUM.--Altitude of land-surface datum is 595 ft. Measuring point: Top of casing, 4.00 ft above land-surface datum.
PERIOD OF RECORD.--November 1965 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, +0.16 ft above land-surface datum, May 22, 1974; lowest measured, 4.74 ft below land-surface datum, Sept. 5, 1972.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 26	1.66	DEC 1	0.56	MAR 28	0.28	JUL 13	2.86

OAKLAND COUNTY

425116083321501. Local number, 5N 8E 8ACAC.
LOCATION.--Lat 42°51'16", long 083°32'15", Hydrologic Unit 04080204, 6 mi northeast of Holly on Van Road.
Owner: State Department of Natural Resources.
AQUIFER.--Sand and gravel of Pleistocene age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 1¼ in, depth 42 ft, screened 39 to 42 ft.
DATUM.--Altitude of land-surface datum is 930 ft. Measuring point: Top of casing, 3.00 ft above land-surface datum.
PERIOD OF RECORD.--November 1965 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 22.30 ft below land-surface datum, Apr. 24, 1974; lowest measured, 26.48 ft Sept. 9, 1966.

WATER LEVEL IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 26	25.42	JAN 18	25.06	MAR 17	24.90	JUN 8	24.38	JUL 20	25.34	AUG 31	25.77
DEC 7	25.10	MAR 7	24.88	APR 28	24.43						

OCEANA COUNTY

433133086082601. Local number, 13N 15W 18AAAA.

LOCATION.--Lat 43°31'33", long 086°08'26", Hydrologic Unit 04060101, approximately 6 mi southwest of Hesperia.
Owner: U.S. Geological Survey

AQUIFER.--Sand of Pleistocene age.

WELL CHARACTERISTICS.--Drilled water table well, diameter 6 in, depth 79 ft, screened 69 to 79 ft.

DATUM.--Altitude of land-surface datum is 703 ft. Measuring point: Top of casing, 2.5 ft above land-surface datum.

REMARKS.--Continuous recorder installed, July 10, 1979.

PERIOD OF RECORD.--August 1977 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 36.10 ft below land-surface datum, May 25, 1978; lowest 40.99 ft Mar. 28, 1982.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	37.34	37.68	37.93	37.17	37.08	37.22	37.53	--	37.24	37.24	37.49	37.77
10	37.38	37.74	37.86	37.07	37.08	37.29	37.54	--	37.24	37.25	37.53	37.83
15	37.45	37.80	37.69	37.08	37.09	37.34	37.61	--	37.20	37.27	37.58	37.89
20	37.52	37.81	37.54	37.05	37.15	37.36	--	37.39	37.20	37.33	37.63	37.94
25	37.59	37.89	37.40	37.01	37.19	37.44	--	37.33	37.19	37.39	37.68	38.00
EOM	37.62	37.91	37.27	37.02	37.17	37.46	--	37.27	37.18	37.43	37.74	38.05

WTR YEAR 1983 MAX 36.91 FEB 2, 1983 MIN 38.05 SEP 29, 1983

OGEMAW COUNTY

442514084164702. Local number, 23N 1E 2BAAA.

LOCATION.--Lat 44°25'14", long 084°16'47", Hydrologic Unit 04070007, 8 mi west of Rose City on south side of Rose City Road.
Owner: Ogemaw County Road Commission.

AQUIFER.--Sand of Pleistocene age.

WELL CHARACTERISTICS.--Drilled water-table well, diameter 1½ in, depth 20 ft.

DATUM.--Altitude of land-surface datum is 1,265 ft. Measuring point: Top of casing, 2.30 ft above land-surface datum.

PERIOD OF RECORD.--November 1968 to October 1971. April 1974 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 7.62 ft below land-surface datum, Apr. 13, 1976; lowest measured, 13.6 ft December 1972.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 22	12.07	JAN 6	12.11	APR 19	10.56	JUL 18	9.91

ONTONAGON COUNTY

465002089321601. Local number, 51N 41W 8BDBC.

LOCATION.--Lat 46°50'02", long 089°32'16", Hydrologic Unit 04020101, 325 ft south of M-64, 1.5 mi east of Silver City.
Owner: State Corrections Department.

AQUIFER.--Freda Sandstone of Keweenawan age.

WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in, depth 100 ft, cased to 32 ft.

DATUM.--Altitude of land-surface datum is 620 ft. Measuring point: Plywood instrument shelf, 3.50 ft above land-surface datum.

PERIOD OF RECORD.--October 1958 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 8.20 ft below land-surface datum, Apr. 15, 1959; lowest measured, 21.82 ft Dec. 15, 1976.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
DEC 7	9.92	FEB 17	9.85	APR 25	8.30	SEP 16	14.26

OTSEGO COUNTY

445920084425801. Local number, 30N 3W 19ABBB.
LOCATION.--Lat 44°59'20", long 084°42'58", Hydrologic Unit 04070007, on Old Alba Road 3 mi southwest of Gaylord.
Owner: U.S. Geological Survey.
AQUIFER.--Sand of Pleistocene age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in, depth 87 ft, screened 72 to 87 ft.
DATUM.--Altitude of land-surface datum is 1307 ft. Measuring point: Top of casing, 2.5 ft above land-surface datum.
PERIOD OF RECORD.--January 1979 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured 30.69 ft below land-surface datum, July 24, 1979; lowest measured, 35.82 ft Apr. 1, 1982.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 6	35.06	DEC 6	35.49	FEB 28	35.15	MAY 17	34.58	JUL 25	32.72	AUG 30	33.07
NOV 8	35.35	JAN 20	35.22	APR 12	34.96	JUN 21	33.07				

PRESQUE ISLE

451634083441801. Local number, 33N 6E 8BBBB.
LOCATION.--Lat 45°16'34", long 083°44'18", Hydrologic Unit 04070006, south side of Grand Lake Highway, 2 mi west and 1 mi north of Posen.
Owner: A. Styma.
AQUIFER.--Traverse Group.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in, depth 61 ft.
DATUM.--Altitude of land-surface datum is 815 ft. Measuring point: Top of casing, 0.5 ft above land-surface datum.
PERIOD OF RECORD.--December 1959 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 5.10 ft below land-surface datum, Mar. 2, 1979; lowest measured, 16.83 ft Mar. 5, 1963.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 17	10.52	JAN 18	8.82	APR 13	6.39	JUL 27	12.04

ROSCOMMON COUNTY

442722084350701. Local number, 24N 2W 20BABA.
LOCATION.--Lat 44°27'22", long 084°35'07", Hydrologic Unit 04070007, 2 mi south of Roscommon and 0.5 mi east of highway M-18 on highway M-103.
Owner: State Department of Natural Resources.
AQUIFER.--Sand of Pleistocene age.
WELL CHARACTERISTICS.--Jetted water-table well, diameter 8 in, depth 14 ft, open bottom.
DATUM.--Land-surface datum is 1,145.30 ft National Geodetic Vertical Datum of 1929. Measuring point: Top of casing, 2.50 ft above land-surface datum.
REMARKS.--Federal key well.
PERIOD OF RECORD.--December 1934 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 2.30 ft below land-surface datum, Apr. 23, 1971; lowest, 6.23 ft Dec. 6-11, 1949.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	4.71	4.77	4.33	--	4.14	4.20	3.50	3.34	2.76	3.56	4.32	4.36
10	4.73	4.79	3.95	--	4.20	3.60	3.36	2.96	2.89	3.70	4.43	4.45
15	4.76	4.45	3.77	--	4.24	3.56	3.24	2.99	3.02	3.86	3.84	4.51
20	4.80	4.38	3.79	3.98	4.28	3.56	3.21	2.98	3.17	4.02	4.05	4.35
25	4.74	4.36	3.80	4.05	4.27	3.55	3.23	3.00	3.33	4.11	4.13	4.12
EOM	4.77	4.35	3.78	4.11	4.28	3.57	3.30	2.76	3.44	4.22	4.26	4.19

WTR YEAR 1983 MAX 2.73 JUN 3, 1983 MIN 4.81 OCT 19, 1982

SAGINAW COUNTY

431457084194401. Local number, 10N 1E 22DADA1.
LOCATION.--Lat 43°14'57", long 084°19'44", Hydrologic Unit 04080203, west side of Merrill Road 0.35 mi north of Marion Springs. Owner: U.S. Geological Survey.
AQUIFER.--Saginaw Formation of Pennsylvanian age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in, depth 210 ft, cased to 170 ft.
DATUM.--Altitude of land-surface datum is 657 ft. Measuring point: Plywood instrument shelf, 2.5 ft above land-surface datum.
PERIOD OF RECORD.--December 1977 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 7.93 ft below land-surface datum, Feb. 10, 1981; lowest 10.09 ft Sept. 15, 1983.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	9.69	9.63	9.41	9.27	9.10	9.06	9.04	8.88	8.74	9.18	9.60	9.86
10	9.63	9.75	9.53	9.16	9.12	9.05	8.89	8.97	8.90	9.28	9.68	9.93
15	9.64	9.69	9.43	9.20	9.04	9.08	8.93	8.93	8.95	9.28	9.68	10.09
20	9.70	9.60	9.30	9.34	9.10	8.98	8.91	8.87	9.08	9.41	9.75	9.86
25	9.81	9.64	9.27	9.16	9.15	9.11	8.92	8.81	9.18	9.51	9.84	9.96
EOM	9.71	9.48	9.37	9.10	9.11	9.01	8.90	8.68	9.05	9.55	9.85	9.98

WTR YEAR 1983 MAX 8.62 MAY 2, 1983 MIN 10.09 SEP 15, 1982

SANILAC COUNTY

433439082523601. Local number, 13N 13E 12ADAA.
LOCATION.--Lat 43°34'39", long 082°52'36", Hydrologic Unit 04090001, on Wheatland Road 3 mi east and .75 mi north of Argyle. Owner: U.S. Geological Survey.
AQUIFER.--Marshall Formation of Mississippian age.
WELL CHARACTERISTICS.--Drilled artesian observation well, diameter 6 in, depth 130 ft, cased with plastic pipe to 48 ft, open bottom.
DATUM.--Altitude of land-surface datum is 805 ft. Measuring point: Plywood instrument shelf, 2.5 ft above land-surface datum.
PERIOD OF RECORD.--October 15, 1976 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 16.44 ft below land-surface datum, Apr. 3, 1982; lowest 22.71 ft Nov. 20, 1979.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	20.03	19.85	18.65	18.49	18.31	18.09	17.52	17.09	17.19	18.64	19.82	20.16
10	20.07	19.92	18.58	18.46	18.42	18.01	17.32	17.05	17.51	18.89	20.01	20.36
15	20.16	19.62	18.75	18.51	18.51	18.16	17.17	17.30	17.88	19.21	19.31	20.54
20	20.23	19.61	18.40	18.65	18.07	17.96	17.26	17.31	18.29	19.53	19.61	20.30
25	20.23	19.13	18.32	18.56	18.00	18.04	17.48	17.28	18.60	19.76	19.71	20.27
EOM	20.27	18.96	18.35	18.59	17.98	17.58	17.49	17.19	18.45	19.88	19.90	20.34

WTR YEAR 1983 MAX 16.97 MAY 8, 1983 MIN 20.54 SEP 15, 1983

SCHOOLCRAFT COUNTY

461720085565201. Local number, 45N 13W 16CCCB.
LOCATION.--Lat 46°17'20", long 085°56'52", Hydrologic Unit 04060106, at headquarters building Seney Wildlife refuge. Owner: U.S. Fish and Wildlife Service.
AQUIFER.--Limestones of Upper Ordovician age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 4 in, depth 151 ft, cased to 65 ft.
DATUM.--Altitude of land-surface datum is 710 ft. Measuring point: Top of casing, 3.60 ft below land-surface datum.
PERIOD OF RECORD.--June 1952 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 4.64 ft below land-surface datum, Apr. 13, 1971; lowest, 6.50 ft Oct. 23, 1963.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	5.63	5.50	5.41	5.17	5.27	5.29	5.21	5.30	5.25	5.66	6.07	6.23
10	5.50	5.56	5.35	5.27	5.30	5.12	5.18	5.32	5.36	5.70	6.13	6.26
15	5.52	5.36	5.38	5.31	5.26	5.22	5.13	5.31	5.43	5.80	6.10	6.26
20	5.50	5.35	5.31	5.36	5.29	5.17	5.23	5.33	5.49	5.89	6.14	6.16
25	5.51	5.39	5.17	5.29	5.31	5.24	5.31	5.32	5.55	6.01	6.18	6.07
EOM	5.55	5.40	5.21	5.29	5.30	5.23	5.32	5.21	5.59	6.08	6.21	6.08

WTR YEAR 1983 MAX 5.03 MAR 8, 1983 MIN 6.26 SEP 7, 1983

VAN BUREN COUNTY

421945085481502. Local number, 2S 13W 2BBCB2.
LOCATION.--Lat 42°19'45", long 085°48'15", Hydrologic Unit 04050001, 16 mi east of Bangor on Fish Lake Road, 2.5 mi north of M-43.
Owner: Rex Martin.
AQUIFER.--Sand of Pleistocene age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 4 in, depth 40 ft, screened 36 to 40 ft.
DATUM.--Altitude of land-surface datum is 737 ft. Measuring point: Top of casing, 1.00 ft above land-surface datum.
PERIOD OF RECORD.--May 1981 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 9.04 ft below land-surface datum, Mar. 20, 1982; lowest measured, 12.01 ft Dec. 17, 1983.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 17	12.01	DEC 1	11.03	APR 20	10.72	JUN 1	10.40	JUL 12	11.40	AUG 23	11.85
NOV 1	11.98	MAR 9	10.69								

WASHTENAW COUNTY

421228083331601. Local number, 3S 7E 24CACA.
LOCATION.--Lat 42°12'28", long 083°33'16", Hydrologic Unit 04090005, at Ypsilanti Township waterworks on Bridge Street.
Owner: Ypsilanti Township.
AQUIFER.--Sand of Pleistocene age.
WELL CHARACTERISTICS.--Drilled water-table well, diameter 4 in, depth 80 ft, screened 77 to 80 ft.
DATUM.--Land-surface datum is 665.65 ft National Geodetic Vertical Datum of 1929. Measuring point: Top of coupling, 3.00 ft above land-surface datum.
REMARKS.--Water level affected by nearby pumping.
PERIOD OF RECORD.--July 1943 to June 1945, December 1949 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 5.79 ft below land-surface datum, Jan. 5, 1950; lowest, 22.66 ft Feb. 13, 1971.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	12.60	12.58	14.06	14.10	--	--	--	--	--	--	13.82	13.98
10	12.54	--	14.17	--	--	--	--	12.83	--	--	--	13.53
15	12.59	--	14.25	--	--	--	--	--	--	--	--	13.32
20	12.66	13.66	14.22	--	--	--	--	--	13.43	--	13.54	14.34
25	12.67	13.96	--	--	--	--	--	--	--	--	13.79	15.46
EOM	12.63	13.94	--	--	--	14.58	--	--	--	--	14.18	14.72

WTR YEAR 1983 MAX 12.40 NOV 2, 1982 MIN 15.46 SEP 25, 1983

Temperatures of ground water are measured as part of a state-wide water resource investigation in cooperation with Michigan Department of Natural Resources. The purpose of these measurements is to determine the natural ground-water temperature of selected points throughout the State. These data can be used to estimate ground-water temperatures in many areas in the State. Measurements of temperature were made by means of "lazy" thermometers (Heath, 1964).

TEMPERATURE (°C) OF GROUND WATER AT INDICATED DEPTH

DATE	WATER TEMPER-ATURE (°C)	DATE	WATER TEMPER-ATURE (°C)	DATE	WATER TEMPER-ATURE (°C)
ALGER COUNTY, 45N 19W 25BDCD1 (LAT 46°16'08", LONG 86°37'38") DEPTH 66 FT					
OCT 6, 1982	7.5	MAY 2 . . .	7.0	SEP 14 . . .	8.0
JAN 14, 1983	7.5	JUN 23 . . .	7.0		
DICKINSON COUNTY, 43N 28W 32ADAB1 (LAT 46°04'59", LONG 87°49'37") DEPTH 31 FT					
NOV 2, 1982	7.5	MAR 2 . . .	7.0	JUN 28 . . .	6.0
NOV 29 . . .	7.5	MAR 30 . . .	7.0	JUL 29 . . .	6.0
DEC 29 . . .	7.5	APR 28 . . .	6.5	SEP 6 . . .	6.5
FEB 1, 1983	7.5	MAY 27 . . .	6.0		
LENAWEE COUNTY, 5S 1E 12DDBD1 (LAT 42°02'46", LONG 84°15'06") DEPTH 39 FT					
OCT 5, 1982	9.5	FEB 23 . . .	10.0	JUN 20 . . .	9.0
NOV 19 . . .	10.0	MAR 28 . . .	9.5	AUG 4 . . .	9.0
JAN 3, 1983	10.0	MAY 10 . . .	9.0	SEP 16 . . .	9.5
MENOMINEE COUNTY, 37N 26W 19DADA1 (LAT 45°35'00", LONG 87°33'15") DEPTH 17 FT					
NOV 8, 1982	11.0	FEB 2 . . .	7.0	JUN 30 . . .	8.0
JAN 12, 1983	7.5	MAR 29 . . .	5.5	SEP 14 . . .	12.0
MUSKEGON COUNTY, 11N 15W 34ADDD1 (LAT 43°18'06", LONG 86°04'44") DEPTH 31 FT					
OCT 26, 1982	10.0	MAR 28, 1983	8.5	JUL 13 . . .	8.5
DEC 1 . . .	9.5				
OAKLAND COUNTY, 5N 8E 8ACAC1 (LAT 42°51'16", LONG 83°32'15") DEPTH 42 FT					
OCT 26, 1982	9.0	MAR 17 . . .	8.5	JUL 20 . . .	9.0
DEC 7 . . .	9.0	APR 28 . . .	8.5	AUG 31 . . .	9.0
JAN 18, 1983	8.5	JUN 8 . . .	8.5		
ONTONAGON COUNTY, 46N 38W 30ADDD1 (LAT 46°21'18", LONG 89°05'43") DEPTH 50 FT					
OCT 19, 1982	7.5	FEB 15 . . .	7.0	APR 26 . . .	6.5
DEC 6 . . .	7.5	MAR 22 . . .	7.0	JUN 2 . . .	6.5
JAN 10, 1983	7.5				

The following continuous-record streamflow or stage stations in Michigan have been discontinued or converted to partial-record stations. Daily streamflow or stage records were collected and published for the period of record shown for each station.

Station number	Station name	Drainage area (mi^2)	Period of record
	Streams Tributary to Lake Superior		
04028000	Montreal River at Ironwood, MI	63.0	1918-22, 1924-25, 1949-54
04030500	Black River at Ramsay, MI	a82	1924-25
04031000	Black River near Bessemer, MI	200	1954-82
04031500	Presque Isle River at Marenisco, MI	171	1945-82
04032000	Presque Isle River near Tula, MI	261	*1945-73
04032500	Iron River near White Pine, MI	98.1	1952-57
04035000	East Branch Ontonagon River near Mass, MI	272	1942-79
04038000	Cisco Branch Ontonagon River near Watersmeet, MI	62.2	1942-44
04039500	South Branch Ontonagon River at Ewen, MI	348	*1942-71
04041000	Perch River near Sidnaw, MI	63.1	*1912-15
04042000	Sturgeon River near Baraga, MI	379	1927-31, 1942-47
04042500	Otter River near Elo, MI	162	*1942-72
04043000	Sturgeon River near Arnheim, MI	705	1942-74
04043500	Dead River near Negaunee, MI	138	1902-03
04044000	Dead River at Forestville, MI	158	1898-1902
04044500	Carp River near Marquette, MI	a86	1902-03
04044563	Big Creek near Harvey, MI	17.0	1979-81
04044573	Cedar Creek near Harvey, MI	9.04	1979-81
04044583	Cherry Creek near Harvey, MI	4.53	1965-70, 1979-81
04044595	Silver Creek at Harvey, MI	8.58	1979-81
04045000	Tahquamenon River at Newberry, MI	200	1934-36
	Streams Tributary to Lake Michigan		
04046000	Black River near Garnet, MI	a28	*1951-78
04046500	South Manistique Lake Outlet at Curtis, MI	a44	1942-44
04047000	North Manistique Lake Outlet at Helmer, MI	a15	1942-44
04047500	Manistique River near Germfask, MI	a120	1942-50
04048000	Fox River at Seney, MI	107	1942-44
04048500	East Branch Fox River near Germfask, MI	104	1942-44
04049000	Holland Creek near Seney, MI	a13	1938-42
04049500	Manistique River at Germfask, MI	341	*1938-70
04050000	Goose Pen Outlet at Germfask, MI	--	1939-41
04050500	Grays Creek near Germfask, MI	a36	1938-40
04051000	Pine Creek near Germfask, MI	a11	1938-40
04051500	Sand Creek near Germfask, MI	a6	1938-40
04052000	Driggs River near Seney, MI	a70	1938-42
04052500	Walsh Creek near Seney, MI	a12	1938-42
04053000	Driggs River near Germfask, MI	114	1938-41
04053500	Marsh Creek near Shingleton, MI	a20	1938-42
04054000	Marsh Creek near Germfask, MI	a15	1938-41
04054500	Duck Creek near Blaney, MI	a92	1938-54
04055000	Manistique River near Blaney, MI	704	*1938-70
04055500	Creighton River near Shingleton, MI	a35	1938-42
04056000	West Branch Manistique River near Manistique, MI	322	1938-56
04057000	Indian River near Manistique, MI	302	*1938-71
04057500	Sturgeon River near St. Jacques, MI	167	1950-51
04057820	Middle Branch Escanaba River near Greenwood, MI	73.3	*1972-82
04057900	Black River near Republic, MI	34.4	*1961-68
04058000	Middle Branch Escanaba River near Ishpeming, MI	128	1954-75
04058100	Middle Branch Escanaba River near Princeton, MI	210	1961-82
04058130	Green Creek near Princeton, MI	13.8	1976-82
04058300	Warner Creek near Palmer, MI	14.2	*1961-68, 1972-78
04058400	Goose Lake Outlet near Sands Station, MI	37.5	*1965-82
04058500	East Branch Escanaba River at Gwinn, MI	124	1954-80
04060000	Iron River near Iron River, MI	a65	1900-05
04060500	Iron River at Caspian, MI	92.1	1948-80
04062100	Peshekee River near Michigamme, MI	66.5	*1961-68
04062200	Peshekee River near Champion, MI	133	*1961-78
04062230	Michigamme River near Michigamme, MI	194	1968-82
04062270	Michigamme River near Champion, MI	231	1964-69
04062300	Michigamme River at Republic, MI	240	*1961-75
04062400	Michigamme River near Witch Lake, MI	316	1964-80
04065000	Menominee River near Iron Mountain, MI (at Lower Quinnesec Falls)	a2,420	1898-99, 1902-14
04065300	West Branch Sturgeon River near Randville, MI	56.1	1958-81
04065397	East Branch Sturgeon River near Hardwood, MI	90.8	1977-83
04065500	Sturgeon River near Foster City, MI	237	1954-80
04065600	Pine Creek near Iron Mountain, MI	16.8	1971-81
04067000	Menominee River below Koss, MI	3,730	1907-09, 1913-81

See footnotes at end of table.

Station number	Station name	Drainage area (mi²)	Period of record
	Streams Tributary to Lake Michigan--Continued		
04095500	Galien River near New Troy, MI	a47	1945-47
04096000	East Branch Galien River near New Troy, MI	19.2	1945-47
04096272	Beebe Creek near Hillsdale, MI	42.4	*1974-78
04096312	Sand Creek at Litchfield, MI	20.6	*1974-77
04096325	Soap Creek near Litchfield, MI	10.9	1974-77
04096340	St. Joseph River at Clarendon, MI	144	*1974-77
04096500	Sauk (East Branch Coldwater) River at Coldwater, MI	--	1937-62
04097000	St. Joseph River at Mendon, MI	918	1902-05
04097060	Little Portage Creek near Fulton, MI	27.0	*1964-67
04097170	Portage River near Vicksburg, MI	68.2	*1946-51, 1964-79
04097200	Gourdneck Creek near Schoolcraft, MI	7.29	1964-72
04097500	St. Joseph River at Three Rivers, MI	1,350	1953-83
04098500	Fawn River near White Pigeon, MI	192	*1903-04, 1957-75
04102000	St. Joseph River at Berrien Springs (at and near Buchanan), MI	4,081	1901-06, 1909-31, 1951-58
04102320	Paw Paw River near Paw Paw, MI	195	1980-82
04102420	Paw Paw River near Hartford, MI	311	1980-82
04102850	South Branch Kalamazoo River near Albion, MI	146	1971-76
04103000	Reed's Springs near Albion, MI	--	1904-06
04103500	Kalamazoo River at Marshall, MI	449	1948-82
04104000	Battle Creek at Charlotte, MI	a67	1948-54
04104500	Battle Creek at Bellevue, MI	178	1948-53
04105800	Gull Creek near Galesburg, MI	38.1	*1964-73
04106000	Kalamazoo River at Comstock, MI	1,010	1931, 1932-79
04106190	Portage Creek near Portage, MI	18.6	1964-67
04106500	Portage Creek at Kalamazoo, MI	a48	1947-58
04107000	Gun River at dam, near Shelbyville, MI	a30	1946-47
04107500	Gun River near Martin, MI	a35	1946-47
04108000	Kalamazoo River near Allegan, MI	a1,470	1903-07
04109500	Portage River below Little Portage Lake, near Munith, MI	a55	1944-56
04110000	Orchard Creek at Munith, MI	a49	1944-56
04110500	Portage River near Munith, MI	118	1944-46
04111000	Grand River near Eaton Rapids, MI	661	1950-82
04112850	Sycamore Creek near Holt, MI	80.6	1975-80
04112904	Mud Lake Drain at Lansing, MI	4.28	1975-76
04113097	Carrier Creek near Lansing, MI	12.1	1975-80
04113500	Sebewa Creek near Sunfield, MI	24.1	1954-56
04114000	Grand River at Portland, MI	1,385	1952-82
04115500	Fish Creek near Carson City, MI	145	1936-38
04118000	Thornapple River near Caledonia, MI	773	1930-38, 1951-82
04118500	Rogue River near Rockford, MI	234	1952-82
04119300	Grand River at Eastmanville, MI	5,230	1976-77
04120000	Crockery Creek at Slocums Grove, MI	--	1902-03
04120500	Higgins Lake Outlet (head of Muskegon River) near Roscommon, MI	a58	1942-50
04121000	Muskegon River near Merritt, MI	355	*1946-73
04123000	Big Sable River near Freesoil, MI	127	*1942-73
04123500	Manistee River near Grayling, MI	159	*1942-73
04124500	East Branch Pine River near Tustin, MI	a63	*1952-63
04125000	Pine River near LeRoy, MI	118	*1953-63
04125500	Pine River near Hoxeyville, MI	251	1952-82
04126500	Little Manistee River near Stronach, MI	233	1930-31
04127500	Boardman River at Traverse City, MI	--	1903-04
	Streams Tributary to Lake Huron		
04128500	Indian River at Indian River, MI	583	1942-82
04129500	Pigeon River at Afton, MI	159	1942-81
04130000	Cheboygan River near Cheboygan, MI	865	1942-82
04131000	Rainy River near Onoway, MI	a79	1942-52
04131500	Rainy River near Ocqueoc, Mi	85	*1952-79
04132000	Black River near Cheboygan, MI	597	*1942-74
04132500	Thunder Bay River near Hillman, MI	232	*1945-72
04133000	Upper South Branch Thunder Bay River near Lachine. MI	171	1945-53
04133500	Thunder Bay River near Bolton, MI	588	1945-80
04134000	North Branch Thunder Bay River near Bolton, MI	184	1945-80
04134500	Lower South Branch Thunder Bay near Hubbard Lake, MI	146	1945-53
04135000	Thunder Bay River near Alpena, MI	a1,260	1901-08
04136000	Au Sable River near Red Oak (Lovells), MI	a1,000	1908-16, 1930-31
04137000	Au Sable River at Bamfield, MI	a1,420	1902-13
04137500	Au Sable River near Au Sable, MI	a1,540	1939-40
04138000	East Branch Au Gres River at McIvor, MI	84	*1950-73
04138500	Au Gres River near National City, MI	169	1950-81
04139000	Houghton Creek near Lupton, MI	29.7	*1950-72
04139500	Rifle River at "The Ranch" near Lupton, MI	56.8	1950-71
04140000	Prior Creek near Selkirk, MI	21.4	*1950-72

See footnotes at end of table.

Station number	Station name	Drainage area (mi²)	Period of record
	Streams Tributary to Lake Huron--Continued		
04140500	Rifle River at Selkirk, MI	117	1950-82
04141000	South Branch Shephards Creek near Selkirk, MI	1.15	*1951-78
04141500	West Branch Rifle River near Selkirk, MI	a52	*1951-63
04143000	Rifle River at Omer, MI	364	1902-03
04143500	North Branch Kawkawlin River near Kawkawlin, MI	101	1951-82
04145500	Bad River near Brant, MI	a89	*1948-59
04146500	Flint River at Columbiaville, MI	486	1932-33, 1948-52
04148000	Flint River at Genesee, MI	593	1930-52
04150000	South Branch Cass River near Cass City, MI	238	1948-80
04151000	Cass River at Vassar, MI	a700	1910-28, 1948-70
04152500	Tobacco River at Beaverton, MI	487	1948-82
04153000	Kinney Creek near Clare, MI	a9	1935-36
04153500	Salt River near North Bradley, MI	138	1934-71
04154500	Chippewa River near Midland, MI	597	*1947-72
04156500	Tittabawassee River at Freeland, MI	a2,530	1903-09, 1912-36
04157500	Sebewaing River (State drain) near Sebewaing, MI	a62	1939-54
04158000	East Fork Sebewaing River (Columbia drain) near Sebewaing, MI	a38	1940-54
04158500	Pigeon River near Owendale, MI	53.2	1952-82
04159000	Pigeon River near Pigeon, MI	a86	1946-52
04159488	Silver Creek near Jeddo, MI	20.6	1978-82
04159900	Mill Creek near Avoca, MI	169	*1963-75
04160000	Mill Creek near Abbottsford, MI	208	*1947-64
04160500	Black River near Port Huron, MI	634	1931, 1932-43
	Streams Tributary to Lake St. Clair		
04161000	Clinton River at Auburn Heights, MI	123	*1935-40, 1956-82
04161500	Paint Creek near Lake Orion, MI	38.5	*1955-75
04161820	Clinton River at Sterling Heights, MI	309	1978-83
04162000	Red Run near Royal Oak, MI	36.5	1953-68
04162500	Bear Creek at Warren, MI	17.3	1954-57
04163000	Big Beaver Creek at Warren, MI	25.2	1954-58
04163500	Plum Brook near Utica, MI	22.9	1954-66
04163900	Red Run near Cady, MI	--	†1979-82
04164010	North Branch Clinton River at Almont, MI	9.56	*1962-68
04164050	North Branch Clinton River nearr Romeo, MI	49.7	*1964-69
04164150	North Branch Clinton River near Meade, MI	89.6	*1967-72
04164200	Coon Creek near Armada, MI	10.0	*1965-70
04164250	Tupper Brook at Ray Center, MI	8.62	*1959-64
04164350	Highbank Creek near Armada, MI	14.9	*1965-70
04164360	East Branch Coon Creek near New Haven, MI	36.1	*1967-72
04164400	Dear Creek near Meade, MI	12.7	*1960-65
04164450	McBride Drain near Macomb, MI	5.79	*1959-64
04164800	Middle Branch Clinton River at Macomb, MI	41.0	*1962-68, 1969-82
04165000	Middle Branch Clinton River near Mount Clemens, MI	a51	1947-49
04165200	Gloede Ditch near Waldenburg, MI	16.0	*1959-64
04165556	Clinton River By-Pass below weir at Mount Clemens, MI	--	†1979-83
04165557	Clinton River By-Pass at mouth at Mount Clemens, MI	--	†1979-83
	Streams Tributary to Detroit River		
04167000	Middle River Rouge near Garden City, MI	99.9	*1930-33, 1947-77
04168500	Lower River Rouge at Dearborn, MI	a96	1930-33
	Streams Tributary to Lake Erie		
04169000	Hayes Creek at Commerce, MI	a8	1946-51
04169500	Huron River at Commerce, MI	57.3	*1946-75
04171000	Davis Creek near Whitmore Lake, MI	a70	1952-54
04171500	Ore Creek near Brighton, MI	a31	1951-68
04172500	Portage River near Pinckney, MI	79.1	*1944-71
04173000	Huron River near Dexter, MI	522	*1904, 1946-72, 1975-77
04113500	Mill Creek near Dexter, MI	128	1952-83
04174000	Huron River at Dexter, MI	--	1904-16
04175340	Stony Creek at Oakville, MI	68.0	1970-81
04175500	Huron River at Flat Rock, MI	851	1904-11, 1912-22
04175600	River Raisin near Manchester, MI	132	1970-81
04175700	River Raisin near Tecumseh, MI	267	*1956-80
04176000	River Raisin near Adrian, MI	463	*1953-78
04176400	Saline River near Saline, MI	94.6	*1965-77

a Approximately.
* Previous or subsequent operation as a crest-stage partial-record station.
† Stage record only.

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FACTORS FOR CONVERTING INCH-POUND UNITS TO INTERNATIONAL SYSTEM UNITS (SI)

The following factors may be used to convert the inch-pound units published herein to the International System of Units (SI). This report contains both the inch-pound and SI unit equivalents in the station manuscript descriptions.

Multiply inch-pound units	By	To obtain SI units
	Length	
inches (in)	2.54×10^{1}	millimeters (mm)
	2.54×10^{-2}	meters (m)
feet (ft)	3.048×10^{-1}	meters (m)
miles (mi)	1.609×10^{0}	kilometers (km)
	Area	
acres	4.047×10^{3}	square meters (m^2)
	4.047×10^{-1}	square hectometers (hm^2)
	4.047×10^{-3}	square kilometers (km^2)
square miles (mi^2)	2.590×10^{0}	square kilometers (km^2)
	Volume	
gallons (gal)	3.785×10^{0}	liters (L)
	3.785×10^{0}	cubic decimeters (dm^3)
	3.785×10^{-3}	cubic meters (m^3)
million gallons	3.785×10^{3}	cubic meters (m^3)
	3.785×10^{-3}	cubic hectometers (hm^3)
cubic feet (ft^3)	2.832×10^{1}	cubic decimeters (dm^3)
	2.832×10^{-2}	cubic meters (m^3)
cfs-days	2.447×10^{3}	cubic meters (m^3)
	2.447×10^{-3}	cubic hectometers (hm^3)
acre-feet (acre-ft)	1.233×10^{3}	cubic meters (m^3)
	1.233×10^{-3}	cubic hectometers (hm^3)
	1.233×10^{-6}	cubic kilometers (km^3)
	Flow	
cubic feet per second (ft^3/s)	2.832×10^{1}	liters per second (L/s)
	2.832×10^{1}	cubic decimeters per second (dm^3/s)
	2.832×10^{-2}	cubic meters per second (m^3/s)
gallons per minute (gal/min)	6.309×10^{-2}	liters per second (L/s)
	6.309×10^{-2}	cubic decimeters per second (dm^3/s)
	6.309×10^{-5}	cubic meters per second (m^3/s)
million gallons per day	4.381×10^{1}	cubic decimeters per second (dm^3/s)
	4.381×10^{-2}	cubic meters per second (m^3/s)
	Mass	
tons (short)	9.072×10^{-1}	megagrams (Mg) or metric tons